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FOOD TECHNOLOGY ABSTRACTS

Vol. 27 No. 4
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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	poise
P	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

GENERAL

682

Rhodes (ME). **Educating professionals and consumers about extended-shelf-life refrigerated foods.** *Food Technology* 45(4): 1991: 162, 164

Education and training programs to professionals and consumers on food safety and proper handling of extended-shelf-life refrigerated foods are dealt in this article. CSA

683

Wrolstad (RE). **Ethical issues concerning food adulteration.** *Food Technology* 45(5): 1991: 108, 112, 114, 117

This article discusses two juice adulteration cases: adulterated cranberry juice cocktail and beech-nut adulterated apple juice and presents thought-provoking questions and recommendations as to what actions should be taken by individuals in such situations. CSA

684

Bhag Mal and Sudhir Kochhar. **Under-utilized trees for food: Promise and potentials.** *Indian Farming* 41(8): 1991: 36-41

The authors cover exhaustively the bamboo species suitable for cultivation for food and table purposes giving details of parts used in different food preparation. They have given a detailed list of trees/speceies used for vegetable and table purpose, of some of the exotic tree species of food value: chemical composition and general characteristics/fatty acid composition for some of the under-utilized indigenous trees. SD

685

Dattatreyulu (M). **India's food exports to global markets. Exportable surpluses - key to expanding exports.** *Indian Food Industry* 10(2): 1991: 16-20

This article discusses the problems and challenges in India's food export and the export prospects of various commodities like wheat, basmati rice, tea, coffee, tobacco, spices, cashew, cotton, fresh and processed fruits and vegetables, marine products, meat products, oilcakes, sugar and poultry. CSA

686

Bhat (RV). **Pattern of detention of foods of Indian origin at ports of entry in USA.** *Indian Food Industry* 10(2): 1991: 21-22

This article attempts to make a study on the pattern of detention of foods of Indian origin at the ports of entry in the USA. It was found in 1989 that among the 2465 consignments found to be not conforming to the Food and Drug Adminstration specifications from different countries, 186 consignments were of Indian origin. The cause of detention were the presence of pathogenic bacteria and animal filth in commodities like rice, sesame seed and shrimps. Remedial measures to prevent contamination are discussed. CSA

687

Parpia (HAB). **Human resource development in food science and technology. A socio-technological approach.** *Indian Food Industry* 10(3): 1991: 24-28, 33

This article discusses about the effective use of agro-food system as a means of socio-economic development which requires well-trained and culturally-oriented human resource in food science and technology. The socio-technological challenges faced and the socio-technological education and training needs of developing countries are discussed. CSA

688

Sakariah (KK). **Food industry - manpower needs and training.** *Indian Food Industry* 10(3): 1991: 29-31

The increasing trend in production and demand both in internal and in export markets for certain traditional foods and tropical fruit products makes it necessary to have more manpower in the area of food science and technology. The present status in food technology training, the understanding and mutual co-operation that has to exist between the institutes/universities and the industry and the need for manpower in processed food industries is projected in this article. CSA

689

Kishor Kher. **Non-technical manpower requirements of the food processing industry.** *Indian Food Industry* 10(3): 1991: 32-33

This article covers the requirement, recruitment, team building and the future of commercial or non-technical manpower of the food processing industry. CSA

FOOD PROCESSING

690
Chang (KLB) and Halek (GW). **Analysis of shear and thermal history during co-rotating twin-screw extrusion.** *Journal of Food Science* 56(2): 1991: 518-531

A computation procedure was developed for calculating contributions of frictional and viscous heat generation during co-rotating twin-screw extrusion. Application of energy balance to experimental data (mechanical energy input, feed rate, feed moisture, screw speed, die pressure, barrel wall and dough temp. profiles) indicated how conditions affected fill, filled length, shear and thermal energy inputs to the foods. Kneading blocks increased degree of fill in partially filled sections, and dissipated 4 - 6 times more viscous heat than conveying elements in completely filled sections. Energy input profiles along extruder screw axis clearly demonstrated how heat generation from shear and heat transfer between extruder and foods influenced total energy input. AS

FOOD ENGINEERING AND EQUIPMENT

691
Potty (VH). **Food irradiation and cost consideration.** *Indian Miller* 21(3): 1990: 3-6

A brief general type of article wherein the irradiation of food has been compared with other preservation methods like chemical disinfestation, refrigeration and dehydration. Fumigation of spices and modified atm. storage of fruits were also compared with irradiation. SRA

692
Sheen (S) and Hayakawa (K-I). **Parametric analysis for the freezing of spheroidal or finitely cylindrical objects with volumetric changes.** *Journal of Food Science* 56(2): 1991: 543-549

This study was made to develop regression equations for predicting freezing time or spheroidal (prolates or oblates) and finitely cylindrical foods which account for volumetric changes, and to examine the influence of volumetric expansion on estimates of freezing time. Analysis showed that the convective surface heat transfer coeff. was the most significant factor affecting accuracy of calculated freezing time followed by operational temp., thermophysical properties and food dimensions. Effect of volumetric expansion on freezing time estimation was not significant. SRA

693
Ramaswamy (H), Van de Voort (FR), Raghavan (GSV), Lightfoot (D) and Timbers (G). **Feed-back temperature control system for microwave ovens using a shielded thermocouple.** *Journal of Food Science* 56(2): 1991: 550-552, 555

Results indicate a thermocouple-based temp. feed-back system could successfully be employed to control a microwave magnetron and maintain a constant sample temp. for aqueous samples over a wide range of vol. The power to vol. ratio had to be adjusted or maintained so that the heating rate did not exceed the thermocouple response time in the case of smaller volumes. Such a system could find applications where microwave heating effects are to be studied, such as enzyme inactivation or for control of microwave processes like blanching, drying or pasteurization. SRA

Equipments

694
Rangaswamy (K), Karunanithi (R), Manohar Jesudas (D) and Swaminathan (KR). **Low-cost tray for papain collection.** *Invention Intelligence* 25(9): 1990: 419-420

A low-cost papain collection tray suitable for quick fixing on to the trunks of any papaya plant has been developed, which are light in wt. (500 g), can be easily fabricated, and costs only Rs. 20/unit. SRA

695
He (H) and Hoseney (RC). **A critcal look at the electric resistance oven.** *Cereal Chemistry* 68(2): 1991: 151-155

An electric resistance oven (ERO) was used to study the properties and electric resistance of dough at increasing temp. In this study, a modified ERO was used to improve the flow of CO_2 released from the dough to the detector. The results showed that heating methods not only determined the profile of dough temp. but also affected the expansion, CO_2 release patterns, and electrical resistance of dough. The resistance of dough containing yeast was three times higher than that of dough without yeast. To obtain a fully baked loaf, input power needed to be sufficient to raise the dough temp. to 100 C and to compensate for the heat loss to the atm. Baking with the ERO at room temp. resulted in temp. gradients from the center to the outer layer of the dough, with the greatest gradient near the top of the dough. This probably was caused by dissipation of heat to the environment and by the lack of electrical heating in the crown area of the dough. AS

ENERGY IN FOOD PROCESSING

696

Jain (SK). **Appropriate solar applications for rural areas.** *Invention Intelligence* 26(3): 1991: 126-131

Some of the aspects on simple technologies for utilisation of solar energy to meet rural energy needs, particularly for water heating, cooking, drying of vegetables and fruits, and conversion of brackish water into potable water are discussed. All these solar appliances are competitive with existing appliances using conventional energy sources, and can be adopted right away. SRA

FOOD CHEMISTRY AND ANALYSIS

Chemistry

697

Ikegami (T), Nagashima (K), Shimoda (M), Tanaka (Y) and Osajima (Y). **Sorption of volatile compounds in aqueous solution by ethylene-vinyl alcohol copolymer films.** *Journal of Food Science* 56(2): 1991: 500-503, 509

The use of ethylene-vinyl alcohol copolymer (EVOH) films as sealant in soft packages from the viewpoint of effects of ethylene content, biaxial drawing and film thickness on sorption of volatile compounds has been evaluated in this study. With regard to EVOH, equilibrium swelling values gave rise to a bimodel solubility parameter distribution with maxima at δ values of 8.5 assigned to ethylene units and 14.5 to vinyl alcohol units. Comparing distribution ratios of EVOH with those of middle-density polyethylene (MDPE), the ratios were 1:100 for terpene hydrocarbons, 1:10 for esters, 1:2 for alcohols, and 1:1 for aldehydes. By biaxial orientation of EVOH film, the sorption could be depressed below 60%. Results suggest that EVOH film are more appropriate than MDPE for food container lining. SRA

Chemistry(Analytical)

698

Fay (JM). ***Icacina oliviformis* (Icacinaceae): a close look at an underexploited food plant. II. Analyses of food products.** *Economic Botany* 45(1): 1991: 16-26

The proximate analysis of the seeds and tuberous roots of *Icacina oliviformis* from Central African Republic indicated that the seeds contain: 80.7% Nitrogen-free extract (NFE), 14.0% crude protein, and 0.5% crude fat (dry wt.). The av. moisture content of live seeds is 18.3%. The roots contain 84.5% NFE, 4.4% crude protein, and 1.6% crude fat (dry wt.). The moisture content of fresh root is ca. 59%. The amino acid profile of the seed protein is comparable to that of a protein of moderately high quality. The nutritional value of the food products derived from *I. oliviformis* compares favourably with that of the most commonly cultivated crops in the area where this sp. is exploited. GS

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

699

Weng (Z), Hendrickx (M) and Tobback (P). **Immobilized peroxidase: A potential bioindicator for evaluation of thermal processes.** *Journal of Food Science* 56(2): 1991: 567-570

A novel bioindicator has been proposed for evaluating thermal processes under conditions of pasteurization (60 - 85 C). The heat-stable fraction of the covalently immobilized peroxidase in/on glass beads in the environment of dodecane was used for this purpose with a Z value of 10.1 C and a Dref value of 22 min at 70 C. The lethality $(f)_{bio}$ values read from the bioindicator coincided with the target $Ft^{10.0}$-values integrated from the time-temp. curves according to the general method. The proposed bioindicator could be scaled down accordingly, encapsulated in a small vial, located in the centre of a food unit and used to evaluate lethality at that point during thermal processing. A single-point lethality could be obtained when the encapsulated bioindicator was very small compared to the food unit. SRA

700

Weng (Z), Hendrickx (M), Maesmans (G), Gebruers (K) and Tobback (P). **Thermostability of soluble and immobilized horseradish peroxidase.** *Journal of Food Science* 56(2): 1991: 574-578

In this study, the thermal characteristics (Z-value, decimal reduction time and activation energy) of both soluble and modified peroxidase in aqueous and non-aqueous solvents has been investigated. Two fraction model is used to describe thermal inactivation kinetics in all these cases. By immobilizing the enzyme both the Z value and D value changed substantially. In non-aqueous solvents, the hydrophobicity (log P) of the organic solvent had a profound effect on D value of the enzyme, but had less effect on the Z-value. A Z value

of 11.1 C was obtained for immobilized peroxidase in dodecane, which may be used for further investigation as a bioindicator (biological time-temp.-integrator) for evaluating pasteurization process. If the Z value of a heat stable enzyme was near 10 C in a given temp. range, it has potential use as a bioindicator for thermal processing. SRA

Microorganisms

Bacteria

701
Wenzel (JM) and Marth (EH). **Behaviour of *Escherichia coli* 0157:H7 or *Yersinia enterocolitica* in the presence of *Streptococcus cremoris* in a medium with internal pH control.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 164-168

Behaviour of *Escherichia coli* 0157:H7 or *Yersinia enterocolitica* in a medium with internal pH control (IPCM-1) and containing *Streptococcus cremoris* (*Lactococcus lactis* subsp. cremoris) was determined. Samples of IPCM-1 were inoculated to contain, per milliliter, ca., 10^3 CFU *E. coli* 0157:H7 or *Y. enterocolitica* and *S. cremoris* (ca., 2.9×10^5) and incubated at 25 or 30 C for 18 h. Populations of *E. coli* in controls were 10^8 and 10^9 CFU/ml after 18 h of incubation at 25 and 30 C, resp. *Y. enterocolitica* controls contained ca., 10^8 CFU/ml after 18 h regardless of incubation temp. IPCM-1 is ready for use when a pH of 5.5 is reached after 16 - 18 h or incubation. This pH was reached in almost all trials after 18 h of incubation. *Escherichia coli* was affected less by presence of *S. cremoris* than was *Y. enterocolitica*. After 18 h incubation at 25 and 30 C, populations of *E. coli* had increased to 10^7 and 10^8 CFU/ml, resp., in samples of IPCM-1 containing the pathogen and the lactic culture. Although *Y. enterocolitica* was more sensitive than *E. coli* to the effects of *S. cremoris*, 10^5 - 10^6 of the pathogen were present per milliliter of treatment samples after 18 h of incubation at either temp. Although some inhibition was caused by presence of *S. cremoris*, substantial numbers of *E. coli* 0157:H7 and *Y. enterocolitica* were present in IPCM-1 when it is said to be ready for use. AS

Clostridium botulinum

702
Doyle (MP). **Evaluating the potential risk from extended-shelf-life refrigerated foods by *Clostridium botulinum* inoculation studies.** *Food Technology* 45(4): 1991: 154-156

Types and number of *C. botulinum* strains required: methods for spore production, preparation and enumeration: number of spores inoculated: methods of inoculation: packaging of product: time and temp. of incubation: sample size, sampling times and number of samples: botulinal toxin testing procedure and types of product analyses are the various guidelines discussed in determining the potential for *C. botulinum* toxin production in refrigerated foods. CSA

Clostridium perfringens

703
Cudjoe (KS), Thorsen (LI), Sorensen (T), Reseland (J), Olsvik (), Granum (PE). **Detection of *Clostridium perfringens* type A enterotoxin in faecal and food samples using immunomagnetic separation (IMS)-ELISA.** *International Journal of Food Microbiology* 12(4): 1991: 313-321

A simple, rapid sensitive immunoassay, based on immumomagnetic particles (Dynabeads M-280) was developed for detection and quantitation of *Clostridium perfringens* type A enterotoxin from faecal and food extracts. The assay had a detection limit of 2.5 ng/ml enterotoxin in homogenous of faecas and inoculated meat extracts. The specificity was confirmed by both cross immunoelectrophoresis and Western immunoblotting techniques: using a purified enterotoxin as standard. AS

Escherichia coli

704
Franco (BDGM), Gomes (TAT), Jakabi (M) and Marques (LRM). **Use of probes to detect virulence factor DNA sequences in *Escherichia coli* strains isolated from foods.** *International Journal of Food Microbiology* 12(4): 1991: 333-338

Escherichia coli strains were isolated from 96 food samples (32 milks, 4 dairy products, 36 raw meats, 7 meat products, 7 sandwiches and 10 ready-to-eat meals). A total of 306 calories was submitted to hybridization assays with DNA probes for the following virulence factors: heat-labile toxins (LT-I and LT-II) , heat-stable toxins (ST-h and ST-p), Shiga-like toxins (SLT-I and SLT-II), adherence factor of enteropathogenic *E. coli* (EAF) and invasive factor (INV). Six colonies isolated from 4 food samples hybridized with the probes for LT-II (3 colonies isolated from a milk sample), SLT-I and SLT-II (1 colony isolated from raw bovine meat) or EAF (2 colonies isolated from two raw chicken meat samples). AS

Listeria monocytogenes

705

Brown (WL). **Designing *Listeria monocytogenes* thermal inactivation studies for extended-shelf-life refrigerated foods.** *Food Technology* 45(4): 1991: 152-153

Guidelines for evaluating the safety of thermal processes for inactivation of *Listeria monocytogenes* in extended-shelf-life refrigerated foods are discussed. These factors include type and number of strains of *L. monocytogenes* to use as a inoculum: methods of production, enumeration and standardization of inoculum: size of inoculum: methods for inoculating different types of products: packaging of products: sample sizes and number of samples to test: heating of products: detn. of D and Z values in the lab.: enumeration methods and product comp. CSA

Staphylococus aureus

706

Smith (JL) and Marmer (BS). **Death and injury in *Staphylococcus aureus* 196E. Effect of growth temperature.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 169-172

The incubation temp. at which *Staphylococcus aureus* 196E was grown affected its degree of thermal injury and death upon subsequent heat treatment. Using a heat treatment of 52 C for 1 h, lethality was low (one log or less) and injury was high (> 3 logs) for cells grown at 37 or 42 C under aerobic conditions. However, for *S. aureus* grown aerobically at 12 or 19 C, lethality was high (> 3 logs) but injury was reduced. Shifting cells grown at 12, 19 or 28 to 37 C for 5 h yielded cells that were less readily killed by the 52 C heat treatment. Growth at 28, 37 or 42 C under anaerobic conditions produced cells that were thermally resistant (approx. one log or less of killing). Cells grown anaerobically at 19 C were most resistant than aerobic cultures. Injury was greater with 19 and 28 C cells grown anaerobically than aerobically: the reverse was true with 37 and 42 C cells. The presence of nalidixic acid or rifamycin during the shift-up period (28 C grown cells shifted to 37 C for 5 h) inhibited the gain in thermotolerance but chloramphenicol was only slightly inhibitory. The data suggest that *S. aureus* growing in foods stored at lower temp. should be killed more readily by lower processing temp. Since temp. abuse of foods would lead to staphylococci with increased heat resistance, foods should be stored at refrigerated temp. until they are heat processed. AS

Fungi

Mushrooms

707

Paakkonen (K) and Plit (L). **Equilibrium moisture content and the state of water in processed Northern milk cap mushroom (*Lactarius trivialis*).** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 121-124

The state of water in differently processed Northern Milk Cap mushrooms (*Lactarius trivialis*) was studied by differential scanning calorimetry (DSC). For DSC measurements the *Lactarius* powders were humidified over saturated salt solutions. The melting curve of the powders was compared with the water sorption isotherm. The non-freezable water obtained by calorimetry was in accordance with the water sorption isotherm. The blanched material dried with air at room temp. contained unexpectedly large amounts of freezable water at high a_w values. The blanched material dried with heated air originally contained more freezable water than the untreated material. AS

Hygiene

708

Wadstrom (T) and Ljungh (A). ***Aeromonas* and *Plesiomonas* as food - and waterborne pathogens.** *International Journal of Food Microbiology* 12(4): 1991: 303-311

Aeromonas and *Plesiomonas* have become increasingly recognized as human enteropathogens. *Plesiomonas shigelloides* has mainly been recovered form various seafoods, whereas *Aeromonas* sp. also multiply rapidly at +4 C which is a significant risk in food storage. *Aeromonas* sp. have furthermore been recovered from fresh water sources, and some isolates are resistant to chlorination which makes it a further risk factor. No large food- or waterborne outbreaks have been reported so far with *Aeromonas* sp. Various virulenece factors involved in intestinal infections are described such as enterotoxins, cytotoxins and adhesins. AS

Safety

709

Flores (A). **Professional ethics and food safety.** *Food Technology* 45(5): 1991: 124, 126, 129

This article discusses the moral principles that warrant the responsibility of ensuring food safety. Aspects covered are human rights and food safety, food safety and professional ethics and problems with setting safety standards. CSA

Saftey

710
Groth (EIII). **Communicating with consumers about food safety and risk issues.** *Food Technology* 45(5): 1991: 248, 250, 252-253

This article focusses on the food safety and risk issues that need to be communicated to the consumers. Aspects covered include public debates over food safety; experts' contributions in food safety debates; public perception of risks and various aspects to be communicated to the consumers. CSA

BIOTECHNOLOGY

711
Harlander (SK). **Biotechnology - a means for improving our food supply.** *Food Technology* 45(4): 1991: 84, 86, 91-92, 95

This article presents an overview of how biotechnology can impact the food chain. Various aspects related to biotechnology such as overcoming limitation of traditional methods; benefits to the agricultural sector; engineered organisms (*Bacillus thuringiensis*, *Rhizobium*) in agriculture and animal agriculture are dealt. Applications of biotechnology in food processing-related areas (fermented foods, processing aids, food ingredients, rapid detection systems and biosensors) and waste management; challenges to the food supply, promise of biotechnology and controversy over food are also discussed. 5 references. CSA

712
Busch (L). **Biotechnology. Consumer concerns about risks and values.** *Food Technology* 45(4): 1991: 96, 98, 100-101

Aspects such as the issue of risk and the issue of food values and how they shape consumer concern are discussed. Five requirements for a safe, secure and meaningful food supply that meets public standards such as minimal processing, authenticity, nutritional adequacy, availability and accessibility are also covered briefly. CSA

713
Welser (JR). **An industrial perspective on biotechnology issues.** *Food Technology* 45(4): 1991: 102, 104, 107, 109

This review article discusses the types of factors to be considered when making an investment in biotechnology and the hurdles to be confronted during technology development. The article also covers some of the current applications in food technology and future developments of biotechnology and the challenges to continued growth. 1 reference. CSA

714
Ingenthron (GD). **Public communications. Genetically improved food crops.** *Food Technology* 45(4): 1991: 110, 112, 114, 117

Aspects related to public communications on genetically engineered food crops are covered. Discusses briefly various findings of related public opinion polls on food and gives some critics' positions on biotechnology. Concluding the article are recommendations for a broad approach for communicating on biotechnology-related issues. CSA

715
Harlander (SK). **Social, moral and ethical issues in food biotechnology.** *Food Technology* 45(5): 1991: 152, 154, 156, 158, 160-161

This article deals with some of the complex issues concerning the acceptance and adoption of biotechnology. Challenges facing agriculture, potential impact of biotechnology on agriculture and food systems, understanding public concerns and the role of the scientist in society are the various aspects covered. CSA

TISSUE CULTURE

716
Schenk (N), Hsiao (K-C) and Bornman (CH). **Avoidance of precipitation and carbohydrate breakdown in autoclaved plant tissue culture media.** *Plant Cell Reports* 10(3): 1991: 115-119

FeNa-EDTA, used in Murashize and Skoog media in the place of $FeSO_4$ + Na_2-EDTA, catalyzes the breakdown of fructose and glucose in the media. Autoclaving FeNa-EDTA separately from the carbohydrate constituents of the medium has the added advantage of preventing precipitation of certain micronutrient elements which improves quality of the medium without resorting to sterilization by filtering. To avoid further precipitation FeNa-EDTA and KH_2PO_4 autoclaved together. SD

717

Bhat (SR) and Chandel (KPS). **A novel technique to overcome browning in tissue culture.** *Plant Cell Reports* 10(6/7): 1991: 358-361

Use of *Dioscorea alata* L. revealed that an exudate from the cut end of the explants browned the culture medium which was lethal in small vol. Sealing the cut ends with paraffin wax controlled the browning by preventing exudation. The advantage of this simple technique over the others is discussed. SD

718

Sudhakar Johnson (T), Ravishankar (GA) and Venkatraman (LV). **Elicitation of capsaicin production in freely suspended cells and immobilized cell cultures of *Capsicum frutescens* Mill.** *Food Biotechnology* 5(2): 1991: 197-205

Capsaicin, an important food additive was produced *in vitro* by free cells and immobilized cells of *Capsicum frutescens* cultured in liquid medium. Elicitation of capsaicin production by curdlan and xanthan treated immobilized *Capsicum* cells was 1.8 and 2.0 folds higher than in control. Curdlan and xanthan combination had synergistic influence and elicited 7.9 folds increase in capsaicin production on 14th day of culture. Sodium alginate (0.05%) elicited 1.8 folds increase in capsaicin in free cells over the control on the 10th day of culture. Chitosan enhanced the permeability of capsaicin from the cells to the exterior and also elicited capsaicin synthesis. AS

FOOD ADDITIVES

719

Collins (TH), Little (K) and Pritchard (PE). **Dehydroascorbic acid: Potential oxidising improver in the CBP ?.** *Flour Milling and Baking Research Association Bulletin* (4): 1991: 91-98

Experiments to compare the use of ascorbic acid (AA) with dehydroascorbic acid (DHA) in different mixing machine atm. are described in this article. Lab.-prepared DHA with a purchased commercial sample are compared and the effect of fat-coating on DHA stability and performance are explored. Results concluded that the three DHA samples had similar performance properties in each of the three mixing machine atm. AA and DHA had similar performance when mixing was at atm. pressure or in 60% oxygen, 40% nitrogen. When mixing under partial vacuum, DHA gave improvements in loaf vol., crumb structure, softness and colour compared with AA. Mixing times were longer to 11 wh/kg. when mixing in air at atm. pressure or 60% oxygen, 40 nitrogen that could be commercial disadvantage over mixing under partial vacuum unless corrected by increasing the speed of the mixing machine. SRA

Antioxidants

720

Empson (K), Labuza (TP) and Graf (E). **Phytic acid as a food antioxidant.** *Journal of Food Science* 56(2): 1991: 560-563

Iron-induced oxidative damage in foods can be inhibited with the use of samll amounts of phytic acid. This compound reduced the rate of ascorbic acid degradation and slowed lipid peroxidation in oil-in-water emulsions and in cooked, refrigerated chicken. Phytic acid has been in use as preservative in soybean oil, meat, fish meal pastes, colouring agents and various other foods. SRA

Stabilisers

Gums

721

Yilmazer (G), Carrillo (AR) and Kokini (JL). **Effect of propylene glycol alginate and xanthan gum on stability of O/W emulsions.** *Journal of Food Science* 56(2): 1991: 513-517

This study showed that propylene glycol alginate (PGA) and xanthan (X) affected rheological stability and the degree of stabilization was a function of concn. and ratio of gum used. The change in viscosity and elasticity appeared to be due to kinetics of aggregate formation and breakdown since coalescence was not a major factor as demonstrated by oil droplet size distribution data. SRA

Sweeteners

722

Ott (DB), Edwards (CL) and Palmer (SJ). **Perceived taste intensity and duration of nutritive and non-nutritive sweeteners in water using time-intensity (T-1) evaluations.** *Journal of Food Science* 56(2): 1991: 535-542

This investigation compared the sweet and bitter taste characteristics of aspartame, acesulfame K, and alitame at equisweetness levels with 10% sucrose/water solutions at 22 C using the time-intensity (T-I) sensory technique. Alitame was comparable to sucrose in all taste characteristics. Aspartame had similar taste characteristics to sucrose with the exception of having greater sweet

intensities with longer duration ($P < 0.001$) following sample expectoration. Acesulfame K differed remarkedly from sucrose. The sweet attribute of acesulfame K appeared quickly ($P < 0.05$) before sample expectoration. This was followed by a moderately intense and lingering bitter character ($P < 0.001$) which reached max. intensity after sample expectoration. AS

CEREALS

723

Gupta (SK). **Standardization of flour.** *Indian Baker* 22(2): 1991: 24-25

The author recommends for biscuits dry gluten 7.5 - 9.0% in short dough var., 9.0 - 10.0% in hard dough var.; 10.0 - 11.5% in fermented dough var.; for bread 11.0 - 13.0% and for cakes 7.0 - 9.0%. In order to get the specified dry gluten, while mixing two flours of different gluten content, the application of Pearson's square is explained with graph. SD

724

Shah (BG), Malcolm (S), Belonje (B), Trick (KD) and Brassard (R). **Effect of dietary cereal brans on the metabolism of trace elements in a long-term rat study.** *Cereal Chemistry* 68(2): 1991: 190-194

To determine the effect of cereal brans on the metabolism of Fe, Zn, Cu and Mn, a seven-month study was conducted using male and female Sprague-Dawley rats. They were fed diets containing cellulose, oat bran, hard red spring wheat bran, soft white wheat bran, corn bran, or rodent chow at 4 or 14% total dietary fiber. During wk 7(phase 1) and wk 24 (phase 2), mineral balance studies were conducted. The diet, urine, feces, liver, heart, muscle, kidney and femur were analyzed for the trace elements. Apparent absorption of the minerals decreased from phase 1 to 2, but tissue levels generally increased with age. Tissue levels were generally higher in females than males. Dietary fiber or phytate did not adversely affect apparent mineral absorption or tissue level. In phase 2, liver iron of the male rats fed diets containing higher endogenous iron levels was approx. 50% higher than that of the males fed diets with lower iron levels. The femur zinc levels in rats fed 14% wheat bran fiber were about 15% lower than those of the other rats, despite higher dietary zinc, but this may not be physiologically meaningful. AS

725

Curioni (A), Peruffo (ADB), Pressi (G) and Pogna (NE). **Immunological distinction between x-type and y-type high molecular weight glutenin subunits.** *Cereal Chemistry* 68(2): 1991: 200-204

Polyclonal antisera were raised against four high mol. wt. glutenin subunits purified by sodium dodecyl sulphate electroendosmotic preparative electrophoresis from the wheat cv Clara 2. Immunoblotting with total protein extracts and gliadins from several wheat cvs revealed that the antisera to x-subunits 1, 5, and 7 bound only to high mol. wt. glutenin subunits, whereas the antiserum to y-subunit 12 also reacted with α-, β- and γ-gliadins. The antisera to subunits 1 and 5 reacted more strongly with x-subunits than with y-subunits, and the antiserum to subunit 12 showed more reaction with y-subunits. Comparison of amino acid sequences suggests that some antigenic determinants typical of the y-type and x-type subunits lie in the N-terminus and in the central domain of the protein, resp. AS

726

Troncone (R) and Auricchio (S). **Gluten-sensitive enteropathy (celiac disease).** *Food Reviews International* 7(2): 1991: 205-231

Aspects covered in this review are: cereal protein and gluten-sensitive enteropathy (GSE), pathogenesis of GSE (theories of pathogenesis, immunology of GSE (gliadin as antigen, major histocompatibility complex class II in GSE, T cell receptor in GSE, humoral immune response and cell-mediated immune response), models of GSE (*in vitro* models of gliadin toxicity, *in vivo* studies of gliadin toxicity and animal models of GSE), epidemiology, clinical features (a typical presentation and diseases associated with GSE), diagnosis and therapy). 128 references. SRA

Oat

727

Collins (FW), McLachlan (DC) and Blackwell (BA). **Oat phenolics: A venalumic acids, a new group of bound phenolic acids from oat groats and hulls.** *Cereal Chemistry* 68(2): 1991: 184-189

A new group of phenolic acids was found in aqueous alcoholic extracts of both oat groats and hulls. These acids occurred as conjugates covalently linked to the amine function of several different orthoaminobenzoic acids. One of the conjugates was pale yellow crystalline solid with a mol. wt. of 325 ($C_{18}H_{15}NO_5$). Mass spectral studies revealed an acid composed of $C_{11}H_{10}NO_3$ and a mol. wt. of 190. Structural analysis (H^1, IIC nuclear magnetic resonance, ultraviolet, etc) allowed formulation of

the acid as 5-(4'-hydroxyphenyl)-penta-2,4-dienomic acid (i.e., 4'-hydroxycinnamylidene-acetic acid), for which the trival name avenalumic acids proposed. Comparison of proton coupling constants of the naturally occurring conjugate with models suggests that the oat constituent is and interconvertible mixture of the 2-E,4-E and 2-Z,4-E isomers, with the former isomer predominating. This assignment was confirmed by total° synthesis of 2-E,4-E-avenalumic acid. Two additional derivatives of avenalumic acid were also detected: the 3'-hydroxy- and 3'-methoxy analogues. These acids, which are the ethylenic homologues of the well-known p-coumaric, ferulic and caffeic acids, may be widely distributed in cereal grains. AS

Rice

728

Raju (GN) and Srinivas (T). **Effect of physical, physiological and chemical factors on the expression of chalkiness in rice.** *Cereal Chemistry* 68(2): 1991: 210-211

Rice starch

729

Chang (S-M) and Liu (L-C). **Retrogradation of rice starches studied by differential scanning calorimetry and influence of sugars, NaCl and lipids.** *Journal of Food Science* 56(2): 1991: 564-566, 570

Rice starch gels with different amounts of amylose had their own characteristics during storage (25 C). In non waxy rice starches, the retrogradation of the high amylose group was faster than that of the low amylose group at early stages of storage. The storage temp. affected both rate of retrogradation and properties of retrograded starch. The effects of additives on retrogradation of rice was dependent on rice var. and storage conditions. In presence of sucrose, extent of retrogradation increased, while in presence of NaCl, it decreased. Effects of maltose, glucose and lipids were dependent on rice starch gel and storage temp. This study could facilitate improvements and development in processing various rice products. SRA

Rye

730

Gudmundsson (M) and Eliasson (A-C). **Thermal and viscous properties of rye starch extracted from different varieties.** *Cereal Chemistry* 68(2): 1991: 172-177

Thermal and viscous properties of rye starch extracted from different cvs were studied and compared with gelatinization parameters and retrogradation of wheat and maize starches. Gelatinization parameters for the rye starches were shown to be lower than those for wheat starch but similar to those for oat starches (literature value). The transition of the amylose-lipid complex was low, which indicated a low lipid content in the starch. Retrogradation of the rye starch was quite low compared with that of wheat and maize starches despite the low lipid content. The viscous properties of the rye starches were investigated in the 60 - 90 C temp. interval. The rye starches increased in viscosity very differently with increasing temp. and differed in their end-viscosity values after 400 sec holding time at 90 C. The gelatinization parameters, retrogradation (enthalpy value after 14 days of storage), and viscosity (end value after 400 sec at 90 C) were correlated with other measured factors, such as falling number, gel volume, amylose leaching and percentage of fissures on the surface of starch granules. Moderate to high correlation was found between gelatinization enthalpy and falling number, end viscosity and percentage of fissures (0.64, -0.72, -0.95 resp.). Gelatinization temp. correlated moderately with falling number, end viscosity, and gel volume (0.61, -0.85 and -0.70, resp). Falling number also had a moderately high correlation with percentage of fissures and amylose leaching (-0.84 and 0.78). Retrogradation (enthalpy value after 14 days of storage) correlated highly with amylose leaching (0.90). End viscosity correlated highly with percentage of fissures and gel volume (0.91 and 0.79). These correlations helped considerably to explain the thermal and viscous properties of the rye starches investigated. AS

Wheat

731

Gill (KS) and Sekhon (KS). **Production and prospects of durum wheat in India.** *Indian Baker* 21(1): 1990: 25-30

Geographical distribution of durum wheat cultivation in India, and the spread of durum cultivation in India due to the disease Karnal bunt, are briefly reviewed. The characteristics of the durum var. have been illustrated which include grain quality, grain comp., milling quality and the extent of usage of durum wheat in pasta and baked product preparation. 21 references. KAR

732

Bakshi (AK) and Nanda (GS). **Wheat-quality improvement (industrial and nutritional)**

programmes at Punjab Agricultural University to match with changing requirements of millers and processors. *Indian Baker* 21(2): 1990: 21-30

The research conducted at the Punjab Agricultural University aims at providing the right type of wheat for manufacturing different bakery items and variables have been bred for this purpose. Variations have been evolved taking into consideration the milling quality, protein content and dough strength which are suitable for cookie, chapathi and macaroni. Efforts also have been continuing to evolve suitable durum wheat and triticales. KAR

733

Lit (GV). **The quality of quality control.** *Indian Baker* 22(1): 1991: 11-20

Physico-chemical and other quality parameters are determined on small representative wheat samples in order to understand about the bulk. The statistical tools like standard deviation and coeff. of variation playing a vital role in substantiating the relaiability of sample means as a true estimate of the bulk are illustrated through various data on impurities, hectolitre wt., moisture, protein and alveograph values. SD

734

Shiiba (K), Negishi (Y), Okada (K) and Nagao (S). **Purification and characterization of lipoxygenase isoenzymes from wheat germ.** *Cereal Chemistry* 68(2): 1991: 115-122

To investigate the mechanism by which lipoxygenase improves the rheological properties of wheat flour doughs, wheat lipoxygenase was extracted first with acetate buffer from wheat germ and fractionated by ammonium sulphate. The lipoxygenase fraction was further purified by diethylaminoethyl (DEAE)-Sepharose chromatography and then separated into three major isoenzymes (L-1, L-2 and L-3) and a minor isoenzyme (L-a) by carboxymethyl-Sepharose chromatography. Each isoenzyme was purified by gel filtration and DEAE-Sepharose chromatography. Sodium dodecyl sulphate-polyacrylamide gel chromatography of these purified isoenzymes exhibited a single band with almost the same retardation factor. These purified lipoxygenase isoenzymes were characterized by enzymatic properties (pH activity profile, thermal sensitivity, substrate specificity, effect of metal ions), amino acid composition, and their effects on wheat flour. After reaction with each purified lipoxygenase isoenzyme, the treated flour exhibited higher foaming activity and lower contents of the sulphydryl group than did the control flour, which received no enzyme treatment. The treated flour also showed a shorter dough development time and less resistance after peak time on a mixogram than did the control flour. The flour treated with the L-3 isoenzyme exhibited the highest foaming activity and bread-making quality. AS

735

Izydorczyk (M), Biliaderis (CG) and Bushuk (W). **Comparison of the structure and composition of water-soluble pentosans from different wheat varieties.** *Cereal Chemistry* 68(2): 1991: 139-144

Water-soluble pentosans were isolated from flours of eight wheat var. belonging to several Canadian classes. The pentosans were fractionated by $(NH_4)sub\ 2SO_4$ precipitation into arabinoxylans and arabinogalactans. The arabinoxylan from flours of Canada western red spring and Canada prairie spring had the lowest degree of branching, and that from the Canada utility class the highest. Among var., the degree of branching of the arabinogalactans was relatively constant, except for the Canada western red spring var. Katepwa, which was substantially lower. The peptide moieties of the arabinogalactans contained high levels of alanine and hydroxyproline. *Cis-* and *trans*-isomers of ferulic acid were found in the arabinoxylans. The ferulic acid content of arabinoxylans from different var. varied significantly; the highest amount was found in the arabinoxylan of the Canada western soft spring var. Fielder. Purified arabinoxylans showed intervarietal differences in the mol. wt. distribution by Speharose CL-4B chromatography; the arabinoxylan from Katepwa had the highest apparent mol. wt. In contrast, the arabinogalactan-peptide fractions had similar mol. wt. as determined by Sephacryl S-300 gel filtration. AS

736

Izydorczyk (M), Biliaderis (CG) and Bushuk (W). **Physical properties of water-soluble pentosans from different wheat varieties.** *Cereal Chemistry* 68(2): 1991: 145-150

The physical properties of water-soluble pentosans and their constituents, arabinoxylan and arabinogalactan, in solution or gels, were investigated using purified preparations from flours of 8 wheat var.: HY 355, HY 320, Oslo (Canada prairie spring), Glenlea (Canada utility), Fielder (Canada western soft spring), Norstar (Canada western hard red winter), Katepwa (Canada western red spring), and Marshall (a hard red spring var. unregistered in Canada). The intrinsic viscosities for arabinoxylans and arabinogalactans ranged between 2.82 - 4.20 dl/g and 0.045 - 0.062 dl/g, resp. Oxidative gelation of 2% (w/v) pentosan and

arabinoxylan solutions (H_2O_2 and peroxidase) was probed by dynamic rheometry. The most rigid gel networks, as assessed by the storage modulus (G') and tanδ (G"/G'), were obtained for the preparations derived from Katepwa, followed by those from HY 355, HY 320 and Fielder. Relatively weak gels were obtained for pentosans from Oslo, Marshall, Norstar, and Glenlea. The storage modulus of arabinoxylan and pentosan gels (2%, w/v) were positively correlated with intrinsic viscosity of the polymers ($r = 0.85$ and $r = 0.83$, resp.; $P < 0.01$). Cross-linked pentosans and arabinoxylans held up to 100g of water per gram of carbohydrate. Although both arabinoxylans and arabinogalactans reduced the surface tension of water, only arabinoxylans effectively stabilized protein foams on heating. AS

Wheat products

737

Kanwaljit Kaur and Geervani (P). **Role of product quality in propogation of wheat based foods.** *Indian Baker* 21(1): 1990: 19-24

The areas that need strengthening for the popularization of wheat based products are indicated. These include maintaining the milling quality, raw materials quality, sensory quality, nutritional quality and storage quality. The techniques involved in the preparation of wheat based products also play an important role in the popularisation of the product. SRA

738

Arya (SS). **Wheat based traditional Indian foods.** *Indian Miller* 21(3): 1990: 17-22

The wheat based Indian traditional products reviewed are chapathies parothas and puris covering the work done for extension of shelf-life by suitable preservation, irradiation and by providing suitable package; suitability of var. for chapathi making and mechanisation of chapathi making process. Fried wheat snacks are another type of traditional preparation in which are included shankarapara, namkeenpara, cuziya, holige, modaka, mathi, samosha, kuchori, sev muttor and others. Efforts made in preparing the instant mixes for some traditional products and the problems encountered in storage of such mixes have been elaborated. Wheat based traditional sweet preparation have also been included covering different products like balusdahi, jalebi, chiroti, phemi, ghevar, sohan papdi, gulab jamun and others. SRA

Wheat flour

739

Narasihman (KS). **Infestation control strategies in wheat flour milling industry.** *Indian Baker* 21(2): 1990: 31-40

This paper has indicated the places and sources of infestation in a flour mill and the effect of infestation on the wheat flour quality and the products prepared from them. Measures have been suggested to control infestation in flour mill including proper santiation; aspiration, scoverting and impact, and finally fumigation. Local or spot fumigation is needed for the equipment and machinery. General fumigation is needed for stocks and the fumigants available in India have been listed along with the dosages, mill fumigation and prophylactic measure have also been covered. KAR

740

Batey (IL), Gupta (RB) and MacRitchie (F). **Use of size-exclusion high-performance liquid chromatography in the study of wheat flour proteins: An improved chromatographic procedure.** *Cereal Chemistry* 68(2): 1991: 207-209

Wheat proteins

741

MacRitchie (F), Kasarda (DD) and Kuzmicky (DD). **Characterization of wheat protein fractions differing in contributions to breadmaking quality.** *Cereal Chemistry* 68(2): 1991: 122-130

Protein fractions from 6 wheat cvs, 3 of good quality and 3 of poor quality, were prepared by fractional extraction of gluten with dilute hydrochloric acid, and the relationship between breadmaking functionality and protein composition was investigated. Functionality was assessed by adding fractions to a base (reference) flour at a level of 1% (protein to flour wt.) and measuring mixograph peak development times and loaf volumes in an optimized baking test. Protein composition was measured by sodium dodecyl sulphate-polyacrylamide gel electrophoresis under reducing and non-reducing conditions, followed by densitometry of the stained patterns. The pattern areas of reduced fractions, which corresponded to total proteins, were divided into subareas representative of five main protein classes: high mol. wt. glutenin subunits; ω-gliadins; low mol. wt. subunits; α-, β-, and γ-gliadins; and albumins plus globulins. Also, the proportion of glutenin in each fraction was estimated for some cvs, as the difference between the total area under the densitometer tracing of the pattern of a fraction reduced (total proteins) and the total area under the densitometer tracing of the pattern of the same fraction unreduced (from which essentially only monomeric proteins enter the gel). The proportion

of high mol. wt. glutenin subunits in the parent glutens increased in accordance with dough strength and, with one exception, loaf volume. As the fraction number increased, the proportion of glutenins generally paralleled the increases observed in dough development time and loaf volume, except for some of the later fractions. AS

Gliadins

742
Il (B), Daun (H) and Gilbert (SG). **Water sorption of gliadin.** *Journal of Food Science* 56(2): 1991: 510-512, 531

Crude wheat gliadin from acetic acid solution showed lower water sorption by pulse and frontal Inverse Gas Chromatography methods as compared to a static method but the pulse data for a highly purified Ponca wheat gliadin from ethanol agreed with static data for crude gliadin. Use of ethanol for dissolving gliadins for IGC column preparation gave sorption equivalent to the static method whereas acetic acid-treated gliadin showed lower water uptake. Acetic acid may compete with water for hydrogen bonding sites on the protein or change the secondary structure to make some hydrophilic sites unavailable. The static method resulted in loss by diffusion of the sorbed acetic acid. AS

MILLETS

Corn

743
Ling (D) and Jackson (DS). **Corn wet milling with a commercial enzyme preparation.** *Cereal Chemistry* 68(2): 1991: 205-206

Corn meals

744
Bookwalter (GN), Lyle (SA) and Nelsen (TC). **Enzyme inactivation improves stability of self-rising corn meals.** *Journal of Food Science* 56(2): 1991: 494-496

A new process to inactivate lipid-affecting enzymes in whole corn, by adjusting whole dent corn to 15% moisture and gradually heating it to 91 or 96 C during passage through a two-stage steam jacketed conveyer, followed by cooling. Self-rising corn meals formulated with 91 or 96 C heat processed corn were more stable upon storage, as shown by decreased fat acidity, increased CO_2 retention and improved uniformity and loaf vol. in corn bread. BV

Corn proteins

745
Wang (CR) and Zayas (JF). **Water retention and solubility of soy proteins and corn germ proteins in a model system.** *Journal of Food Science* 56(2): 1991: 455-458

The independent effects of pH and incubation temp. on water retention (WR) and protein solubility (PS) of soy proteins and corn germ protein flour (CGPF) were significant at $P < 0.05$, except for WR of soy isolate (SI). High WR and PS were obtained with no significant ($P < 0.05$) incubation time effect for all samples in 10 to 30 min. WR related to protein content was higher in CGPF than in the three SP. PS increased with increasing pH from 6 to 8. Highest PS was in the SI and lowest in CGPF and increased with increase in incubation temp. (30 - 70 C) in all samples. SRA

Pearl millet

746
Klopfenstein (CF), Leipold (HW) and Cecil (JE). **Semiwet milling of pearl millet for reduced goitrogenicity.** *Cereal Chemistry* 68(2): 1991: 177-179

It is well estabilished that pearl millet grain (*Pennisetum glaucum: syn., P. typoideum, P. americanum*) is goitrogenic, mainly because of its C-glycosylflavone content. Concn. of the antithyroid compounds have been found to be much higher in the bran than in the endosperm portions of the grain. Traditional dry-roller milling processes are not very efficient at fractionating the grain because of its small size and firmly embedded germ. Therefore, semiwet roller milling was used to separate the grain into flour, shorts, red dog, and bran fractions. Rat-feeding studies showed that the semiwet milling process (in which 25% of the grain was removed as bran) successfully removed the antithyroid properties, as demonstrated by patterns of serum thyroid hormones and thyroid histopathology. Nearly all previous studies have used gray-seeded pearl millet. This study showed that brown- and yellow-seeded pearl millet also had antithyroid effects. Although flavone concn. was higher in the yellow than in the brown millet, antithyroid effects seemed somewhat less severe for the yellow millet, indicating differences in antithyroid potency and/or concn. for the 3 C-glycosylflavones that have been identified in pearl millet grain. AS

Pearl millet flour

747

Akingbala (JO). **Effect of processing on flavonoids in millet (*Pennisetum americanum*) flour.** *Cereal Chemistry* 68(2): 1991: 180-183

Pigments of pearl millet flour had max. absorbance at 355 nm. The absorbance and C-glycosylflavanol content varied among 17 millet varieties. Absorbance was 0.72 and 0.91 mg/100 g, and C-gylcosylvitexin equivalent was 76.6 and 275.7 mg/100 g for Ghana and Ancateurs samples, resp. Increasing levels of decortication from 0 to 50% progressively reduced both absorbance and flavanol concn., but rates differed among samples. Cooking also reduced the absorbance and flavanol content of flour more than did steeping in acid or sour milk. AS

Sorghum

748

Ogundiwin (JO) and Ilori (MO). **Development of stout from sorghum malt.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 182-185

Stout drinks were developed from sorghum malt and sugar. Bitter leaf (*vernonia amygdalina*) extract and residue were used as hop substitutes for flavouring. Roasting sorghum malt at 200 C for 4 h gave an optimum colour, flavour and taste. The addition of 30 g bitter leaf extract and 2 g bitter leaf residue were appropriate for flavouring the wort during boiling. Also addition of 18% sugar adjunct to sorghum wort and 17% v/v caramel to the fermented wort were optimum for stout production. The alcoholic content, original gravities and apparent extracts of the stout drinks produced with SSV3 sorghum malt and 18% sugar were essentially the same as those of a commercial stout. All the stout samples were rated the same as a commercial stout in terms of flavour, colour and foam retention. AS

PULSES

749

Samuel (DVK), Amar Singh and Ilyas (SM). **Pulse dehuller-cum-splitter.** *Invention Intelligence* 25(2): 1990: 88-89

A simple, low-cost machine to remove the outer layer of pulse and to split it into two parts is reported in this paper. The machine was tested on soybean, Bengal gram and pea satisfactorily. The dehulling efficiencies of 94, 97 and 98% resp. were achieved with a capacity of 125 - 140 kg/h at the peripheral speed of 10.99 m/sec. The electricity consumption of machine was 2.15 W-h/K of pulses. This machine was also used for dehusking and splitting cleaned and graded redgram, greengram and blackgram and found the efficiency was over 98% with 10% brokens for all these pulses. The multipurpose and portable machine costs about Rs. 3000, excluding the cost of the prime mover. SRA

750

Gujska (E) and Khan (K). **Functional properties of extrudates from high starch fractions of navy and pinto beans and corn meal blended with legume high protein fractions.** *Journal of Food Science* 56(2): 1991: 431-435

Blending of corn meal or a high starch fraction of navy or pinto beans with the high protein fractions (HPF) gave a better expanded product with modified functional properties. Higher protein content reduced puffing resulting in a more dense product but extruded blends were softer and more fragile than extrudates from corn and high starch fraction (HSF). Expansion properties, water absorption index (WAI) and oil absorption (OAC) were better from combinations of corn blended with HPF upto 20% than from blends of bean fractions. Colour of extruded blends was not affected by protein content. When hull fraction was added to the HSF, some functional properties changed and the extruded product was less fragile and more dense than those without hull. Any of the corn/HPF, HSF/HPF blends could be of use in food applications. SRA

751

Hentges (DL), Weaver (CM) and Nielsen (SS). **Changes of selected physical and chemical components in the development of the hard-to-cook bean defect.** *Journal of Food Science* 56(2): 1991: 436-442

Cowpeas and beans stored at 29 C, 65% rh required prolonged king times; however, seeds stored in other conditions (5 C, 30% rh; 29 C 30% rh; and 5 C, 65% rh) maintained short, stable cooking times throughout storage. Several components appeared related to development of the hard-to-cook defect. During soaking, cowpeas and beans requiring long cooking times had decreased phytate and water-soluble (high methoxyl) pectin, and increased leaching of solids. This supports the proposed theory of the hard-to-cook defect involving phytate-mineral and mineral-pectin interactions. Phytase activity decreased during storage. Starch and protein also play roles in development of the defect since decreased starch and protein solubilities were observed in hard-to-cook legume seeds. SRA

752

Gujska (E) and Khan (K). **Feed moisture effects on functional properties, trypsin inhibitor and hemagglutinating activities of extruded bean high starch fractions.** *Journal of Food Science* 56(2): 1991: 443-447

The results of the exp. showed that quality of navy, pinto and garbanzo beans high starch fractions extrudates could be changed by moisture content during extrusion. Moisture content affected the expansion index (EI), water solubility index (WSI), nitrogen solubility index (NSI) and colour of extruded beans HSF. Navy bean HSF had optimum moisture 27%, and garbanzo bean HSF about 26%. Pinto bean HSF had the best expansion at 20% moisture but other properties improved at higher moisture levels (28 - 30%). The extrusion process reduced trypsin inhibitor activity by about 70 - 85%, the level of decrease determined by moisture content of starting material and temp. Extrusion temp. of 121, 132 and 150 C inactivated hemagglutinating activity of navy, pinto and garbanzo beans. SRA

753

Richardson (JC) and Stanley (DW). **Relationship of loss of membrane functionality and hard-to-cook defect in aged beans.** *Journal of Food Science* 56(2): 1991: 590-591

Black gram

754

Ghazali (HM) and Cheng (SC). **The effect of germination on the physico-chemical properties of black gram (*Vigna mungo* L.).** *Food Chemistry* 41(1): 1991: 99-106

Protein and fat content decreased and vitamin C increased in germinated black gram seed and the latter decreased after 1 day stored germinated seed. Total carotenoid, high in dry seed, decreased substantially on soaking but marginally increased on germination. Simple sugar, high in dry seed was lost on soaking but increased on germination. SD

Cowpeas

755

Uzogara (SG), Morton (ID) and Daniel (JW). **Thiamin, riboflavin and niacin retention in cooked cowpeas as affected by kanwa treatment.** *Journal of Food Science* 56(2): 1991: 592-593

Results showed that cooking of cowpeas (100 C) in Kanwa (a Nigerian local tenderizer) or $NaHCO_3$ decreased levels and retention of vitamins (thiamin, riboflavin and niacin). No significant difference in levels of vitamins in Kanwa-cooked cowpeas from those in $NaHCO_3$ cooked samples. In alkaline cooking process retention of thiamine ranged between 15 - 20%, niacin 26 - 49%, and riboflavin 53 - 64%. Pressure cooking (121 C) of beans or soaking combined with boiling (100 C) improved retention of vitamins in the cooked product. SRA

756

Akinyele (IO) and Akinlosote (A). **Effect of soaking, dehulling and fermentation on the oligosaccharides and nutrient content of cowpeas (*Vigna unguiculata*).** *Food Chemistry* 41(1): 1991: 43-53

Chemical changes studied with 2 cvs of cowpea, fermented (24 h), or soaked (4 h) or dehulled showed that verbacose decreased significantly in all the treatments, stachyose decreased moderately in soaking (29.8%) and dehulling (16.9%), raffinose decreased significantly in dehulling (56%), sucrose increased moderately in soaking (41.9%) and dehulling (45.9%), fructose increased in fermentation (105%) and soaking (43%) and glucose/galactose increased in fermentation (56.4%) but decreased in both soaking (55%) and dehulling (63.6%). All the treatments are effective in decreasing the flatulence properties in cowpeas and increasing the consumer acceptability. SD

Navy beans

757

Kohnhorst (AL), Smith (DM), Uebersax (MA) and Bennink (MR). **Production and characterisation of a protein concentrate from navy beans (*Phaseolus vulgaris*).** *Food Chemistry* 41(1): 1991: 33-42

A modified isoelectric precipitation method of Fan and Sosulki with increased centrifugation speed of 15000 x g yielded 83.9% protein content from dry bean flour whereas salt fractionation method resulted in low conc. yield. The major protein was a 7S protein with three subunits of about 45 - 48 kDa typical of vicilin and 10% of protein was in the form of a 60 kDa fraction. SD

OILSEEDS AND NUTS

Coconuts

758

Menon (ARS) and Madhavan (K). **Copra dryers - versatile machines for the monsoon periods.** *Indian Coconut Journal* 22(1): 1991: 6-9

Various machines for copra drying during the monsoon periods like the small holder's dryer using agricultural waste as fuel: large size copra dryer: solar cabinet dryer and electrical dryer are discussed. The performance data of the various types of dryers are also summed up. CSA

Groundnuts

759

Singleton (JA) and Pattee (HE). **Peanut moisture/size, relation to freeze damage and effect of drying temperature on volatiles.** *Journal of Food Science* 56(2): 1991: 579-581

Moisture levels and seed size both contribute to chemical changes in freeze damaged peanuts. Even at 25% overall moisture peanuts were susceptible to freeze damage. Also increased drying temp. accentuated the chemical changes caused by freeze damage. SRA

Soybeans

760

Sulebele (GA). **Soybean processing industry. An update.** *Indian Food Industry* 10(2): 1991: 23-26

This article presents a statistics of the state-wise area and production of soybean in India: state-wise capacity of soybean processing plants: area, production, processing and export of soybean extraction or meal: export of oilmeals, oilseeds, and minor oils and country-wise export of soybean extraction/meal. Future scenario of the soybean processing industries are also discussed. CSA

761

Sheu (SC) and Chen (AO). **Lipoxygenase as blanching index for frozen vegetable soybeans.** *Journal of Food Science* 56(2): 1991: 448-451

Lipoxygenase (LIP) was more suitable as blanching index than peroxidase (POD) for freezing vegetable soybeans with and without pods. Results showed no significant differences in sensory quality during 180-day frozen storage, while both treatments were significantly different from unblanched samples. Vitamin C in samples using LIP as blanching index was higher than that in unblanched ones but not significantly different from that in samples using POD as an index. Samples using LIP had 11.5% POD activity but no LIP activity, while blanched samples using POD had no LIP or POD activities during storage. Blanching conditions suggested by this study were 1 min at 100 C for vegetable soybeans with pods and 50 sec at 95 C without pods. SRA

Soy products

Soy milk

762

Vijayvaragiya (RR) and Pai (JS). **Lowering of lipoxygenase activity in soy milk preparation by propyl gallate.** *Food Chemistry* 41(1): 1991: 63-67

Lipoxygenase activity of soy milk tested with different levels of antioxidants showed that propyl gallate in combination with citric acid and ascorbic acid caused more inhibition than BHA, BHT and ascorbic acid. SD

Soy proteins

763

Shih (FF). **Effect of anions on the deamidation of soy protein.** *Journal of Food Science* 56(2): 1991: 452-454

Soy protein (SP) were deamidated in the presence of various common anions and changes in physicochemical and functional properties were determined. It was found that SP deamidation could be accelerated in the presence of phosphate or bicarbonate anions. Borate anions were much less effective while acetate, sulphate and chloride anions were totally ineffective. Significant deamidation (> 30%) was normally accompanied by significant peptide bond hydrolysis (> 3%). Deamidated SP isolate with up to 4.5% peptide bound hydrolysis had greatly improved solubility, foam activity and ability to emulsify oil. SRA

Sunflowers

764

Mok (C) and Hettiarachchy (NS). **Heat stability of sunflower-hull anthocyanin pigment.** *Journal of Food Science* 56(2): 1991: 553-555

Anthocyanin pigment was extracted from hulls of a sunflower genotype, Neagra de Cluj, using aqueous SO_2 solutions of varying concn. Thermal stability of the pigment was studied between 65 - 95 C, and pH 1.0 - 5.0. Thermal degradation of the pigment followed first order kinetics. Calculated activation energy was 23.1 plus or minus 2.2 kcal/mole. Extraction of hulls with 1000 p.p.m. SO_2 solution

gave highest anthocyanin content and best thermal stability. The pigment was most stable at pH 3.0. AS

TUBERS AND VEGETABLES

765

Sapers (GM), Miller (RL), Douglas (FWJr) and Hicks (KB). **Uptake and fate of ascorbic acid-2-phosphate in infiltrated fruit and vegetable tissue.** *Journal of Food Science* 56(2): 1991: 419-422, 430

Ascorbic acid-2-phosphate (AAP) and ascorbic acid (AA) were infiltrated into apple and potato tissue to control browning. Apple tissue absorbed more AAP and AA than potato under similar conditions. AAP hydrolysis by endogenous acid phosphatase (APase) yielded AA which accumulated or became oxidized to dehydroascorbic acid, depending on the rate of hydrolysis and browning tendencies of samples. APase activity varied greatly with commodity, method of sample preparation and sample pH. Variation in the ability of AAP to inhibit browning in different products could be explained by these factors. AS

766

Garleb (KA), Bourquin (LD) and Fahey (GCJr). **Galacturonate in pectic substances from fruits and vegetables: Comparison of anion exchange HPLC with pulsed amperometric detection to standard colorimetric procedure.** *Journal of Food Science* 56(2): 1991: 423-426

A HPLC method was developed to identify and quantify galacturonate; results were compared with those from a standard colorimetric procedure. HPLC was also used to determine neutral monosaccharide profile of isolated pectic substances (PS). The PS, isolated with ammonium oxalate from the total dietary fiber of apple, cucumber, celery, grapefruit and radish, were analyzed. Mean PS on original dry matter basis ranged from 6.0 plus or minus 0.51% for apple to 18.5 plus or minus 0.1% for celery. Galacturonate of isolated PS determined using anion exchange chromatography coupled with pulsed amperometric detection was not significantly differnt ($P > 0.2$) from that determined colorimetrically. Major monosaccharides in PS of all substrates were arabinose and galactose. Rhamnose, xylose and glucose also were detected in certain sources in much lower amounts. This HPLC method allows precise quantification of galacturonate and will be useful tool for study of chemical composition of pectin. AS

767

Albrecht (JA), Schafer (HW) and Zottola (EA). **Sulfhydryl and ascorbic acid relationships in selected vegetables and fruits.** *Journal of Food Science* 56(2): 1991: 427-430

Selected vegetables and fruits were analyzed for ascorbic acid, total sulphur, and sulfhydryl-containing (-SH) fractions, shortly after harvest and after 3 wk storage at 2 C and 95 - 100% rh. More than 95% of the original ascorbic acid content was retained in broccoli and brussels sprouts. Ascorbic acid stability in fruits appeared to be due to low pH but that did not explain high retention in broccoli and brussels sprouts. Initial ascorbic acid correlated with total sulphur ($r = 0.909$). Weaker correlations were found between total -SH and protein -SH fractions and ascorbic acid content ($r = 0.626$ and 0.627). The quantity of sulfhydryl containing compounds did not explain ascorbic acid retention mechanisms of the vegetables. AS

Onions

768

Thomas (DJ) and Parkin (KL). **Immobilization and characterization of C-S-lyase from onion (*Allium cepa*) bulbs.** *Food Biotechnology* 5(2): 1991: 139-159

Immobilized form of C-S-lyase (cysteine sulphoxide lyase EC 4.4.1.4) had similar properties like free enzyme with regard to pH dependency of activity and stability and efficiency (K_m) in utilization of substrates. It allows for allium flavour production upon demand by combining the enzyme and its substrate(s). The aroma produced by this system was fresh and characteristics than that derived from processed allium products. SD

Beet

769

Ralet (M-C), Thibault (J-F) and Valle (GD). **Solubilization of sugar-beet pulp cell wall polysaccharides by extrusion-cooking.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 107-112

Sugar-beet pulps were extruded under various conditions with a twin-screw extruder Clextral BC 45. Properties of hydration were not significantly changed after extrusion-cooking treatment. However, water solubility increased from 16.6 to 47.5% with increasing severity of treatment. Pectic substances with a high degree of esterification and high neutral sugar content were the main

polysaccharides solubilized. Their viscosity-average mol. wt. was lower than that of pectins extracted by acidic treatment. AS

Carrots

770

Bolin (HR) and Huxsoll (CC). **Control of minimally processed carrot (*Ducas carota*) surface discoloration caused by abrasion peeling.** *Journal of Food Science* 56(2): 1991: 416-418

Low pH citric acid (2%, 70 C) dip provided a quick and easy way for treating abrasion peeled carrots to inhibit formation of the objectionable white lignification material formed on their surface during storage. No flavour changes were observed. BV

Cassava

771

Tufail (M) and Gowdh (CV). **Nutritive value of raw and processed tapioca meal.** *Poultry Guide* 28(7): 1991: 17-21

Tapioca chips were subjected to simple processing techniques like autoclaving and boiling. A part of raw tapioca chips were coarsely ground and autoclaved at 1.1 kg/cm for 15 min. The material was cooled, dried and stored as autoclaved tapioca meal. The other part of tapioca chips were boiled in sufficient amount of water (1:3 w/r) till it was cooked. This was studied and stored as boiled tapioca meal. The samples were analysed for moisture, crude protein, total ash, acid insoluble ash, ether extract, crude fibre, Ca and P. Crude protein and crude fibre were higher in raw tapioca meal. Total ash and acid insoluble ash were higher in the raw tapioca meal than the processed tapioca meal. Ether extract, Ca and P were almost similar in both raw and processed tapioca meals. The nitrogen corrected metabolizable energy values for raw autoclaved and boiled tapioca meal were 3130, 3390 and 3334 Kcal/Kg resp. The hydrocyanic acid content was higher in raw tapioca and reduced by autoclaving and boiling i.e. 98.80 and 99.22% resp. GS

Potatoes

772

Sarikaya (A) and Ozilgen (M). **Kinetics of peroxidase inactivation during thermal processing of whole potatoes.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 159-163

A simple kinetic model was developed to simulate peroxidase deactivation in whole potatoes during blanching. Simulation of the unsteady state temp. profile development in the tubers was accomplished considering the shape of a tuber similar to a sphere. Peroxidase consisted of heat stable and heat labile isoenzymes. Effects of temp. variations on inactivation of these isoenzymes were modelled with the Arrhenius expression. A trial and error computation scheme was used to predict apparent thermal diffusivity of the potatoes and activation energies of the isoenzymes. Numerical values of these parameters were in agreement with previously published studies. AS

773

Seetharaman (K) and Mondy (NI). **Isopropyl N-(3-chlorophenyl) carbamate (CIPC) effect on nitrogenous constituents of potatoes.** *Journal of Food Science* 56(2): 1991: 532-534

Potatoes treated with 1% or 3% CIPC and stored 16 wks at 5 C and 20 C were analyzed for nitrogenous constituents. Treatment with 1% CIPC significantly ($p < 0.025$) increased total nitrogen and protein content in tubers of two cvs compared to untreated control tubers following storage at 5 C and 20 C. Treatment with 3% CIPC increased total nitrogen and decreased protein in tubers stored at 20 C ($p < 0.025$), but decreased total nitrogen and protein in tubers stored at 5 C. Treating potatoes with CIPC prevented sprouting in both var. and apparently caused the tuber to retain nitrogen. AS

774

Califano (AN) and Calvelo (A). **Thermal conductivity of potato between 50 and 100 C.** *Journal of Food Science* 56(2): 1991: 586-587, 589

Results of this study showed that thermal conductivity (TC) ranged from 0.545 to 0.957 W/m C for potatoes (cv Kennebec) sp. gr. 1070 kg/m^3 and moisture 80%. Experimental values agreed with reported values. TC: K varied with temp. in a quadratic polynomial form, and an empirical relationship was estimated. A model based on the concept of thermal resistance in parallel was compared with experimental results. These were used in heat transfer model that simulated potato frying. Measured and simulated time-temp. curves showed good agreement. SRA

Vegetables

Cucumbers

775

Chavasit (V), Hudson (JM), Torres (JA) and Daeschel (MA). **Evaluation of fermentative bacteria in a model low salt cucumber juice brine.** *Journal of Food Science* 56(2): 1991: 462-465

Bifidobacterium bifidum, *Lactobacillus casei*, *Lactobacillus plantarum*, *Lactococcus diacetylactis*, *Leuconostoc mesenteroides*, *Leuconostoc oenos*, *Pediococcus pentosaceus* and a mixed culture of *Propionibacterium shermanoo* and *P. pentosaceus* were used to ferment a model low salt (2.5% NaCl) cucumber juice brine at 22 - 26 C for 39 days. Percent sugar fermented ranges from 16.2 to 87.7. Substrates were citric acid, fructose, glucose and malic acid. Fermentation products quantitated were acetic acid, acetoin, ethanol, lactic acid, mannitol, and propionic acid with percent carbon revcovery varying from 71.1 to 101.1. Final pH ranged 3.24 to 4.12. Each fermentation differed quantitatively in substrates and products formed suggesting use of these bacteris as cultures to ferment low salt brined cucumbers and generate a variety of unique organoleptic properties. AS

Leafy vegetables

Brussels sprouts

776

Walker (JL), McLellan (KM) and Robinson (DS). **Isolation and purification of superoxide dismutase purified from brussels sprouts (*Brassica oleracea* L. var. *bullata* sub var. *gemmifera*).** *Food Chemistry* 41(1): 1991: 1-9

Brussels sprouts superoxide dismutase, characterized as CuZn-SOD, consisted of 2 major isoenzymes, pI 4.5 and 4.7, A (two possible subunits MW 16000 and 19000, more stable to heat) and B (subunit approx. MW 16000) with different thermal inactivation properties. SD

Lettuces

777

King (ADJr), Magnuson (JA), Torok (T) and Goodman (N). **Microbial flora and storage quality of partially processed lettuce.** *Journal of Food Science* 56(2): 1991: 459-461

Partially processed stored lettuce (*Lactuca sativa*) showed an increase in microbial flora, pH and change in package atm. composition (increasing CO_2 and decreasing O_2). The bacterial count varied greatly depending on number of outer leaves removed and the kind of processing and packaging. Typical initial $\log_{10}$ counts/g were: bacteria 3, 4 - 5.1, yeasts 2.5 - 3.2; and infrequent molds. Commercial packaging inhibited bacterial growth and retarded browning. *Pseudomonas*, *Erwinia* and *Serratia* were the most frequently isolated bacteria. *Cryptococcus*, *Pichia*, *Torulaspora* and *Trichosporon* spp. were the most common yeasts. SRA

Pumpkins

778

Odoemena (CS). **Effect of sprouting on carbohydrate content of fluted pumpkin seed.** *Food Chemistry* 41(1): 1991: 107-111

Sprouting markedly decreased the carbohydrate and increased the total soluble sugar concn. in fluted pumpkin (*Telfairia occidentalis* Hook F.) seed. Dormant fluted pumpkin seed consisted mostly sucrose, small amounts of glucose, fructose, galactose, raffinose and stachyose while sprouted seed contained mostly glucose, fructose, maltose, small amounts of sucrose and another unidentified sugar. SD

FRUITS

Apples

779

Yahia (EM), Liu (FW) and Acree (TE). **Changes of some odour-active volatiles in low-ethylene controlled atmosphere stored apples.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 145-151

The effect of low-ethylene controlled atm. storage (LCA) on the production of 22 odour-active volatiles in 'McIntosh' and 'Cotrland' apples was investigated. Aldehydes and acetates were not affected while butanoates, 2-methyl butanoates, pentanoates and hexanoates were either severely or completely supressed under LCA storage. However, most volatiles were produced normally during ripening of the fruit after LCA storage. Although several volatiles were produced at a lower rate during ripening of the fruit in air after LCA than during ripening immediately after harvest, this cannot be attributed entirely to the action of LCA. Volatiles that were found to be supressed by the action of LCA (3% O_2 + 3% CO_2 + 94% N_2 at 3.3 C, 1-6 p.p.m. ethylene, for up to 8 months) are methyl butanoate,

propyl butanoate, butyl 2-methylbutanoate, hexyl 2-methylbutanoate, butyl hexanoate and hexyl hexanoate. AS

Avocadoes

780

Ronen (R), Zauberman (G), Akerman (M), Weksler (A), Rot (I), Fuchs (Y). **Xylanase and xylosidase activities in avocado fruit.** *Plant Physiology* 95(3): 1991: 961-964

Mature avocado (*Persea americana* Mill) fruits from different cvs were analysed for xylanase and xylosidase activity when monitored on the day of harvest during the season at 1 month intervals. xylanase activity decreased and xylosidase activity increased between January and February and then remained stable until May. When monitored during the ripening process, xylanase activity was constant and xylosidase activity reached a peak at the climax of ethylene evolution and cellulase activity. Xylanase, which originated from *Trichoderma viride* and was added to the medium in which avocado discs were incubated induced ethylene evolution. GS

Lychee

781

Lee (HB) and Wicker (L). **Anthocyanin pigments in the skin of lychee fruit.** *Journal of Food Science* 56(2): 1991: 466-468, 483

The anthocyanins in the skin of lychee fruit were isolated and purified by Sephadex G-25 and LH-20 gel column chromatography, and Sep-Pak C-18 cartridge. Further separation by HPLC on a C-18 column, on-line spectra by photodiode array detection, and acid and alkali hydrolyses were used for identification. Cyanidin-3-rutinoside was the major anthocyanin found. Cyanidin-3-glucoside and malvidin-3-acetylglucoside were also identified. Polymerized anthocyanin pigment was also present, appearing to contribute to the brownish-red colour. AS

Oranges

782

Shaw (PE), Moshonas (MG) and Pesis (E). **Changes during storage of oranges pretreated with nitrogen, carbon dioxide and acetaldehyde in air.** *Journal of Food Science* 56(2): 1991: 469-474

Hamlin, Pineapple and Valencia oranges were stored in controlled atm. (CA) of nitrogen, carbon dioxide or 0.1 - 0.7% acetaldehyde in air 8 - 24 h and changes in seven volatiles during 0 - 8 days determined by gas chromatography. Increases in acetaldehyde, ethyl acetate, ethyl butyrate and ethanol were noted in samples after nitrogen or carbon dioxide CA storage with max. increase 1 - 2 days after treatment. Methanol, methyl butyrate and hexanal were unchanged. Flavour evaluations of control versus treated juice showed no consistant changes from any treatment. Acetaldehyde vapours had little effect on flavour or composition, except for Hamlins, where acetaldehyde and ethyl butyrate levels increased. AS

783

Hart (HE), Parish (ME), Burns (JK) and Wicker (L). **Orange finisher pulp as substrate for polygalacturonase production by *Rhizopus oryzae*.** *Journal of Food Science* 56(2): 1991: 480-483

Orange finisher pulp (OFP), a by-product of orange juice processing forms a suitable substrate for production of polygalacturonase (PG) by *Rhizopus oryzae* (ATCC 24563) via solid state fermentation. OFP contained 3.3% pectin on a wet basis which was suitable for production of PG by *R. oryzae*. PG activity was indicated by increase in liquefaction and uronic acid solubilization and subsequent decrease in pectin content of the solid fraction over a 5-day fermentation. Partial characterization of the enzyme extract indicated pH optimum 5.0 for PG. Viscosity and reducing sugar measurements suggested endohydrolytic activity. Little or no pectinesterase, pectin or pectate lyase activities were detected; therefore potential for direct utilization of the PG exists in the citrus industry. SRA

Raspberries

784

Plowman (JE). **Sugars and acids of raspberries, blackberries and other brambles.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 113-115

Ripe berries of 6 cvs of raspberries, 3 of blackberries and one each of boysenberry and loganberry were analysed for sugars and acids in three crop yrs. If the invertase activity of bramble berries was inactivated shortly after picking to prevent transformations of sugars, then distinct contrasted differences of concn. of sugars were found for raspberries and for blackberries. Raspberries were characterized by a glucose:fructose ratio of about 0.77, with sucrose representing 27 - 45% of the total sugars by wt. Blackberries had a glucose:fructose ratio of about 1.0 and sucrose represented only 10% by wt. of the total sugars. Citric acid was the major

acid of raspberries, with malic present at a much lower concn. Two different acid profiles were identified for blackberries, one consisting of isocitric acid and malic acid but without citric acid, and the other dominated by citric acid with malic and isocitric acid present at lower concn. Boysenberries were close to blackberries in both sugar and acid profiles whereas loganberries had a blackberry-like sugar profile and a raspberry-like acid profile. AS

CONFECTIONERY, STARCH AND SUGAR

785

Rico-Pena (DC) and Torres (JA). **Sorbic acid and potassium sorbate permeability of an edible methylcellulase-palmitic acid film: Water activity and pH effects.** *Journal of Food Science* 56(2): 1991: 497-499

The apparent permeability constants for potassium sorbate and sorbic acid through an edible film composed of methylcellulose and palmitic acid (wt. ratio 3:1) were evaluated as a function of water activity (a_w) and pH. For films with thickness 55 - 66 µm, potassium sorbate permeability increased from 2.3×10^{-10} to 2.0×10^{-8} (mg/sec cm^2)(cm)/(mg/mL) as a_w increased from 0.65 to 0.80. Films were not stable at a_w levels above 0.80. Permeability of the film to sorbic acid at a_w 0.8 decreased from 3.3×10^{-8} to 9.1×10^{-10} (mg/sec cm^2)(cm)/(mg/mL) as pH increased from 3 to 7. At pH 3 undissociated acid was 97.5% and at pH 7 it was 0.4%. AS

Confectionery

786

Suzuki (S) and Okada (Y). **Recent trend and new usage of containers for confectioneries.** *Packaging Japan* 12(63): 1991: 40-44

This article reports the recent trend and new usage of containers such as the magic top, C-pet, pilopack, Al metalized films, A-pet, standing pack, bakery tray and bag with fastner for confectioneries together with an explanation about the raw materials from which any added value can be obtained. CSA

787

Nelson (KL) and Fennema (OW). **Methylcellulose films to prevent lipid migration in confectionery products.** *Journal of Food Science* 56(2): 1991: 504-509

Films of methylcellulose ranging in thickness from 0.2 to 1.0 mil (0.0051 to 0.025 mm), and exposed to peanut oil at 30 C and 5 psig pressure differential, allowed less than 1.0 µg linoleic acid equivalents.$mil^{-1}.cm^{-2}.24\ h^{-1}$ to permeate, provided films were free from imperfections. Examination by scanning electron microscopy verified that many films were imperfect, especially those thinner than 0.2 mil. When films were embedded in chocolate and evaluated by a sensory panel, the 0.2 mil film was detectable, but only slightly objectionable. AS

Starch

788

Ranhotra (GS), Gelroth (JA), Astroth (K) and Eisenbraun (GJ). **Effect of resistant starch in intestinal responses in rats.** *Cereal Chemistry* 68(2): 1991: 130-132

Native starch (NS) extracted from wheat and subjected to five autoclaving and cooling cycles contained 11.5% resistant starch (RS), which was measured as insoluble fiber; NS contained a mere 0.5% RS. Both starches were fed to groups of rats for 4 wks (RS was fed with or without antibiotics). Compared with rats fed NS, those fed treated starch showed a sixfold (RS diet) or nearly 18-fold (RS with antibiotics) increase in fecal wet wt.; increases in fecal vol. paralleled increased in fecal wt. Rats fed treated starch (no antibiotics) digested 37.1% RS; those fed antibiotics digested only 14.3% RS. RS thus appears to by highly resistant to mammalian enzyme and may be classified as a component of fiber. AS

789

Lii (C-Y) and Chang (Y-H). **Study of starch in Taiwan.** *Food Reviews International* 7(2): 1991: 185-203

Review. 35 references. SRA

Sugars

790

Anon. **Premium-quality polydextrose improves lower-calorie foods.** *Food Technology* 45(5): 1991: 102-103

This report gives an outline of "litesse" a premium-quality polydextrose bulking and fat-sparing agent. Its application, production, composition, characteristics, functional properties (caloric value, freezing-point depressant, bland taste, viscosity, humectancy, water activity), regulatory status and labelling are discussed. CSA

791

Poncini (L). **Preliminary thermal degradation studies of pure and raw sucrose in the solid and molten phases - a means of producing industrial useful chemicals.** *Indian Sugar* 40(11): 1991: 811-815

The efficacy of degradation, determined as the percentage conversion of sucrose to glucose, time of heating and yield of anhydrofructose were estimated for both raw sugar solid and melt regimes and compared with pure sucrose under identical conditions. Results of the trials indicated that pure sugar when heated with increase in time and temp. yielded only 0.1% fructose, whereas the percentage conversion of sucrose to glucose at 180 C was nearly 3 times as great as that at 170 C. Further heating at higher temp. beyond 15 and 20 min resulted in caramelization of sugar. There was no caramelization at 170 C of heating, when heated for 75 min. Raw sugar at 170 C gave an optimum anhydrofructose yield (1.6%) after 50 min heating. Impurities in the raw sugar tend to lower the crystal decomposition temp. hence, for the same time of heating more raw sugar is converted glucose than pure sugar. The results for sugar melt study involving pure sucrose showed that shorter duration is needed, compared with the solid study, for optimizing the anhydrofructose yield. From an industrial point of view the utilization of a sugar melt regime appears more favourable than a solid sugar system in terms of efficiency. A GLC investigation of the distillate obtained from a raw sugar melt, heated at 180 C for 37 min gave an optimum anhydrofructose yield of 29%, glucose 15.6%. The sucrose to glucose conversion based on peak area was 6.8%. SRA

BAKERY PRODUCTS

792

Rama (MB). **Functions of ingredients in the manufacture of bakery products.** *Indian Baker* 22(1): 1991: 21-24

Functions of ingredients, wheat flour and other flours, salt, yeast, water, sugar, egg, milk, leavening agents, flavour, surfactants, enzymatic supplements, yeast food, oxidising agents and antimicrobial additives, in the manufacture of bakery products bread in particluar are detailed. SD

793

Chandra Shekar (S). **Selection of flours for bakery products.** *Indian Baker* 22(2): 1991: 13-15

About 90 - 92% wheat crop is *Triticum aestivum* suitable for bakery products, hard var. for bread and soft var. for biscuit and cake. In the absence of proper gradation of these var., moisture of flour should not exceed 14%; satisfactory colour determined by Pekan test, particle size (fine for biscuits, cakes and not fine for bread), about 0.5% total ash content, proper crude protein content (cake 8%, biscuit 9%, crackers 10%, bread 11%) and gluten quality (disintegration time of yeasted dough not exceeding 30 min for soft wheat, 200 min or more for hard wheat). SD

Bread

794

Krishna Kumar (P) and Phoolka (MK). **Requirements of quality raw materials for bakery industry "bread".** *Indian Baker* 21(1): 1990: 11-18

The quality parameters and their specific requirement like moisture content, colour, granularity, protein/gluten content, water absorption power, ash content, damaged starch content, diastatic activity including maltose figure, amylograph, falling number, rheological standards, Brabender farinograph, absorption, peak time, stability time, mixing tolerance index, Brabender extensograph, rope spore count, uric acid test in bread making are reviewed and the optimum requirement of these are indicated. SRA

795

Rama (MB). **Processing stages of breadmaking.** *Indian Baker* 22(1): 1991: 25-29

Different stages of breadmaking process, sieving of flour, preparation of solutions (yeast, sugar, salt, minor ingredients, water), mixing of dough, mixing time and temp., fermentation, knock back of dough, dough make up (scaling, rounding, intermediate proof, moulding, curling, sealing), panning, final proof and baking are clearly detailed including all the physical changes at different stages. SD

796

Vijay Kaul. **Faults in bread. Causes and corrective measures.** *Indian Baker* 22(2): 1991: 16-19

The author has listed causes and corrective measures for faults in bread viz., lack of vol. and crust colour; poor shape; coarse texture; crumbly bread; holes, streaks and cores in bread; poor crumb colour and defects of aroma and taste. SD

797

Balakrishnan (N). **Role of high speed mixer in breadmaking.** *Indian Baker* 22(2): 1991: 21-23

Listing exhaustively the merits and demerits of slow speed and high speed mixers, the author recommends the latter for uniform bread quality between batches. SD

798

Amr (AS). **Characterization and use of samah in the production of flat bread.** *Cereal Chemistry* 68(2): 1991: 155-159

Samah (*Mesembryanthemum forsskalii*) seeds were characterized in respect to their test wt. and 1,000-kernel wt. Analysis revealed that their meal is nonglutenous and contains starch, about 20.50% protein, 5.20% fat, 4.25% ash, and 1.98% fiber (db). Compared with cereal grains, it is rich in iron but low in calcium. Amino acid analysis proved that the protein of samah seeds is high in glutamic acid, arginine, and methionine but limited in leucine and lysine. Amylograph and falling number tests showed that samah meal forms a soft gel at 74 C; mild roasting resulted in increased paste viscosity after holding at 95 C for 15 min and after cooling to 50 C. The brownish bland-tasting meal was used to produce flat bread by blending it with wheat flour at levels of 5, 10, 15 and 20%. The bread obtained from combinations containing up to 10% meal was acceptable. Higher levels resulted in soggy, dull and disintegrating loaves of bread. AS

799

Yaseen (AAE), El-Din (MHAS) and El-Latif (ARA). **Fortification of balady bread with tomato seed meal.** *Cereal Chemistry* 68(2): 1991: 159-161

Tomato seed meal prepared from tomato processing wastes was used as a protein source in the preparation of Egyptian balady bread. Whole and defatted tomato seed meal was added at 5, 10 and 15% wheat flour replacement levels. The influence of this addition on the rheological gas production of the dough, as well as on the organoleptic and chemical properties of balady bread, was studied. High amounts of fat and protein in whole tomato seed meal were found. Water absorption, dough development time, and dough stability were improved by increasing the level of supplementation. Defatted tomato seed meal decreased the mixing tolerance and the dough weakening, compared with those of whole meal. Extensigraph results indicated that dough extensibility, resistance to extension, and dough energy were minimized with increasing tomato seed meal in the formula containing wheat flour. Adding tomato seed meal improved gas production, moisture content, and the diameter of the loaf after baking. Organoleptic evaluation showed that balady bread with less than 10% tomato seed meal received a fancy grade, but more than this resulted in crust and crumb darkening. AS

800

Vanhamel (S), Van Den Ende (L), Darius (PL) and Delcour (JA). **A volumeter for breads prepared from 10 grams of flour.** *Cereal Chemistry* 68(2): 1991: 170-172

A displacement volumeter is described for bread loaves prepared from 10 g of flour. Standard deviations of loaf vol. measurements by the instrument were significantly lower than those by a procedure published earlier. Other advantages of the new apparatus are that it is a closed system and that vol. readings take significantly less time than with the method previously described. With the new volumeter and glass beads of 2 mm diameter, three independent readings gave a reasonable power to discriminate between items that differ in vol. by at least 1 cm^3. AS

801

Sahi (SS) and Sonecha (KD). **Formation and stabilisation of gas cell walls in bread doughs.** *Flour Milling and Baking Research Association Bulletin* (4): 1991: 105-120

This report describes the work carried on dough liquor extracts using surface chemical methods and biochemical analysis. Results indicate that the poor bread making flour produced a greater reduction in the surface tension of the water than good bread making flour. Surface elasticity and viscosity measurements of the interfacial films showed that the good bread making flours on the whole tended to produce strong viscoelastic films whereas poor bread making flour formed only weak films. There is a relationship between the rheological properties of interfacial films and bread making performance. Surface tension and surface elasticity and viscosity appear to be influenced by levels of lipids: higher lipid levels reducing the surface tension of water to greater extent and moderating the mechanical strength of the internal films. Lower lipid levels produce less reduction in surface tension and generally favour formation of mechanically stronger surface films. The type and quality of protein material also appears to be important in producing strongly viscoelastic films. SRA

802

Luning (PA), Roozen (JP), Moest (RAFJ) and Posthumus (MA). **Volatile composition of white bread using enzyme active soy flour as improver.** *Food Chemistry* 41(1): 1991: 81-91

The volatile comp. of bread isolated by dynamic headspace technique, analysed by GC and identified by combined GC/MS showed that addition of enzyme active soy flour increased the concn. of hexanal, 1-hexanol, 1-penten-3-ol, 1-pentanol and 2-heptanone while 2-heptenal and 1-octen-3-ol have only been detected in bread containing soy flour. SD

Pasta

803

Cole (ME), Johnson (DE), Cole (RW) and Stone (MB). **Colour of pregelatinized pasta as influenced by wheat type and selected additives.** *Journal of Food Science* 56(2): 1991: 488-493

Wheat type strongly influenced instrumental colour values of pregelatinized pasta. Formulation of pasta with 1.0% disodium phosphate increased saturation index of dry pasta while addition of 5.0% wheat gluten increased lightness index of rehydrated pasta. Raising levels of glyceryl monostearate from 0.75 to 2.0% increased lightness of dry and rehydrated products. SRA

MILK AND DAIRY PRODUCTS

804

Hughes (DB) and Hoover (DG). **Bifidobacteria. Their potential for use in American dairy products.** *Food Technology* 45(4): 1991: 74, 76, 78-80, 83

This article discusses on bifidiobacteria, focussing specifically on classification, recent research on these organisms, and possible therapeutic benefits obtained from ingestion of bifid-containing foods such as maintenance of normal intestinal microflora balance, improvement of lactose-tolerance of milk products, anti-tumorigenic activity, reduction of serum cholesterol levels and synthesis of B-complex vitamins. This article also presents a perspective on the international market of bifid-containing dairy products and summarizes the market potential these products have in the United States. CSA

805

Kim (SM) and Zayas (JF). **Comparative quality characteristics of chymosin extracts obtained by ultrsound treatment.** *Journal of Food Science* 56(2): 1991: 406-410

Chymosin extracts obtained by ultrasound treatment were darker, less green, less blue and more turbid than controls. Ultrasound treatment did not affect activation energies for proteolytic activity, total viable cell counts or storage stability of chymosin extracts. BV

Milk

806

Duncan (SE), Christen (GL) and Penfield (MP). **Rancid flavour of milk: relationship of acid degree value, free fatty acids, and sensory perception.** *Journal of Food Science* 56(2): 1991: 394-397

This investigation indicated that the correlation between acid degree value (ADV) and rancidity score was 0.13 (P = 0.16). Lab.-prepared rancid samples were assigned higher rancidity scores than farm-collected milk samples with similar ADV. Rancidity scores and ADV increased with storage time. Major free fatty acid concn. increased as ADV increased (r = 0.93, P = 0.0001) for farm milk samples but correlation was low (r = 0.27, P = 0.40) for lab.-prepared rancid samples. SRA

807

Chen (ZY) and Nawar (WW). **Role of milk fat globule membrane in autoxidation of milk fat.** *Journal of Food Science* 56(2): 1991: 398-401, 426

The influence of the milk fat globule membrane (MFGM) on oxidation of milk fat under various conditions was monitored by fatty acid analysis and oxygen consumption at 50 C. The rate of copper-catalyzed oxidation of cream containing the membrane was faster than when the membrane was removed. In the dry state, the isolated MFGM, membrane lipids (ML) and the nonlipid membrane solids (NLMS) inhibited oxidation at 50 and 95 C. In the presence of water, however, all membrane components enhanced oxidation at 50 C. The balance between the accelerating effects of membrane components and the inhibiting influence of other factors appeared to depend on processing conditions. AS

808

Ustunol (Z), Hicks (CL) and Payne (FA). **Diffuse reflectance profiles of eight milk-clotting enzyme preparations.** *Journal of Food Science* 56(2): 1991: 411-415

Eight milk-clotting enzyme preparations were standardized to equal clot time and used to coagulate pasteurized whole milk. Diffuse reflectance profiles were monitored for 60-min using a fiber optic sensor sensitive to infrared light at 950 nm. Modified *Mucor meihei* and *M. pusillus* protease, recombinant chymosin and calf rennet produced

similar profiles. Rates of increase in diffuse reflectance were *Endothia parasitica* > recombinant chymosin > calf rennet > modified *M. methei*, *M. pusillus* var. > Lindt > 50:50 blend of calf rennet and bovine pepsin > unmodified *M. methei* > pepsin. Monitoring milk coagulation as described may be useful during cheese making and allow setting optimal conditions for milk-clotting enzyme preparations. AS

809

Jawad (MA), Dorie (J) and El Murr (N). **Electrochemical quantitative analysis of uric acid in milk.** *Journal of Food Science* 56(2): 1991: 594-595

This procedure demonstrates that electrochemical techniques are useful for direct analysis of uric acid in milk without preparative treatments and without modification of the sample. A concn. of 3.3×10^{-2} ^{g}L milk was detectable. The method proved highly accurate, rapid and precise (coeff. of variation = 3%). SRA

810

Chen (ZY) and Nawar (WW). **The role of amino acids in the autoxidation of milk fat.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 47-50

The effect of amino acids and their analogs on milk fat oxidation were examined under various conditions by measuring oxygen consumption and total unsaturated fatty acids. All the amino acids tested acted as antioxidants, characteristically extending the induction period (IP). Not only primary amino groups are responsible for the antioxidative activities of amino acids, but also the side-chain groups contribute, at least partially, to the protective effects of L-cysteine, L-tryptophan and L-tyrosin. In aqueous and HCl solutions, the antioxidative effects of L-alanine were significantly reduced. The freeze-dried L-lysine-HCl and L-alanine-HCl accelerated, while the corresponding control amino acids inhibited, milk fat oxidation. AS

Milk products

Cheese

811

Anon. **Opportunity pops for heat-stable cheese.** *Prepared Foods* 160(2): 1991: 71

High temp. (HT) cheese contain less than 4% moisture and hence offer shelf stability. They also have lower microbial counts than fresh cheese. As such they are suitable for all sorts of food processing such as extrusion, retort and deep-fat frying and microwave cooking. GS

Cottage cheese

812

Shellhammer (TH) and Singh (RP). **Monitoring chemical and microbial changes of cottage cheese using a full-history time-temperature indicator.** *Journal of Food Science* 56(2): 1991: 402-405, 410

Teleme cheese

813

Tzanetakis (N), Litopoulou-Tzanetaki (E) and Vafopoulou-Mastrojiannaki (A). **Effect of *Pediococcus pentosaceus* on microbiology and chemistry of Teleme cheese.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 173-176

The effect of *Pediococcus pentosaceus* on ripening changes of Teleme cheeses was studied. Log counts of total counts, yeasts, psychrotrophs and proteolytic bacteria ranged between 7.0 - 9.4, 2.9 - 4.7, 3.5 - 6.5 and 6.2 - 8.5, resp. throughout ripening. Log counts of lactic acid bacteria in experimental cheese (6.1 - 8.2) were found at higher levels than for the control (5.9 - 7.8). The pH of experimental cheese was significantly lower, while levels of nitrogen soluble at pH 4.6 (NCN), nitrogen soluble in 12% TCA (TCA-N) and nitrogen soluble in 5% phosphotungstic acid (PTA-N) were significantly higher ($P < 0.05$) than the control. Acetaldehyde levels and acid degree value were similar in both types of cheese. Experimental cheese was significantly ($P < 0.05$) preferred to the control and its maturation time was shortened by 1 month. It seems possible that aroma compounds deriving from amino acids contributed greatly to improved organoleptic characteristics of experimental cheese. AS

Wheys

Whey protiens

814

Phillips (LG), Yang (ST) and Kinsella (JE). **Neutral salt effects on stability of whey protein isolate foams.** *Journal of Food Science* 56(2): 1991: 588-589

Addition of 0.1 M Na_2SO_4, NaCl or NaSCN reduced max. overruns of whey protein isolate (WPI) by 33%, 27% and 38%. This was attributable to an ionic effect, i.e., the ions interacted with countercharges

on the proteins thereby reducing electrostatic interactions. In contrast, at high concn. (1M), Na_2SO_4 improved foam stability by 76% compared to WPI without salt. Chloride had an intermediate effect, whereas NaSCN did not improve foam stability. Increasing NA_2SO_4 concn. (2M) improved foam stability by 127% compared to control. The relative effectiveness of salts at improving foam stability and heat stability followed the Hofmeister series ($SO_4^{2-} < Cl^- < SCN^-$). AS

Milk proteins

Caseins

815

Konstance (RP) and Strange (ED). **Solubility and viscous properties of casein and caseinates.** *Journal of Food Science* 56(2): 1991: 556-559

This integrated study provided information for formulation or forms based on caseins and caseinates functionality. Viscosity and solubility of casein(ate)s could be altered by addition of salts, temp. and pH control. Casein(ate)s were solubilized at the isoelectric point with the use of $CaCl_2$ at appropriate concn. and temp. The addition of NaH_2PO_4 provided limited solubility of the normally insoluble rennet casein and was effective in viscosity enhancement of the proteins studied. SRA

MEAT AND POULTRY

816

Kapsokefalou (M) and Miller (DD). **Effects of meat and selected food components on the valence of nonheme iron during *in vitro* digestion.** *Journal of Food Science* 56(2): 1991: 352-355, 358

Meat

817

Mattila-Sandholm (T) and Skytta (E). **The effect of spoilage flora on the growth of food pathogens in minced meat stored at chilled temperature.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 110-120

The antibacterial activity of naturally contaminated minced meat samples against food poisoning organisms was studied. Bacterial growth was monitored by automated turbidometry in a medium prepared from minced meat. The growth of the food pathogens tested (i.e. *Staphylococcus aureus*, *Listeria monocytogenes*, *Bacillus cereus*, *Yersinia enterocolitica* and *Salmonella infantis*) was minimal after a storage for 3 days at +6 C. Furthermore, antibacterial activity was studied in minced meat samples irradiated and thereafter inoculated with *Pseudomonas* spp., *Lactobacillus* spp., *Pediococcus damnosus* or *Brochothrix thermosphacta* and stored at +6 C. The growth of food pathogens was inhibited by *Lactobacillus* and *Pseudomonas*. *Brochothrix* did not affect the growth of any pathogen. *Pediococcus damnosus* inhibited the growth of salmonellas. The possible role of inhibitory substances, nutrient depletion and cell density are discussed. AS

818

Ali (MS), Fung (DYC) and Kastner (CL). **Comparison of rapid methods for isolation and enumeration of *Clostridium perfringens* in meat.** *Journal of Food Science* 56(2): 1991: 367-370

Recovery of *Cl. perfringens* (ATCC 12924, ATCC 12917, and ATCC 14809), from thioglycollate broth and ground beef samples by Fung's Double Tube (FDT) method was signifiantly higher ($P < 0.05$) than that by Oxyrase Enzyme (OE), Gas Pak Anaerobic System (GPAS), and Anaerobic Petri Dish (APD) methods. FDT gave better recovery (84%) in less time (8 - 10 h) at 42 C compared to the OE method (61%). FDT was also least costly. BV

819

Correia (LR), Mittal (GS) and Usborne (WR). **Selection criteria of meat emulsion fillers based on properties and cooking kinetics.** *Journal of Food Science* 56(2): 1991: 380-386

Textural and functional properties of meat emulsions with or without fillers were determined in the raw state, at product-temp. of 30, 40, 50, 60 and 70 C, and after showering. Reaction kinetics modelled the cooking process, and based on property changes during cooking, kinetics parameters were calculated. Regression models of enthalpy changes of activation for product properties were developed as a function of filler properties. Regression models of fully cooked meat emulsion properties with respect to filler properties were also developed. Filler selection was based on regression models. AS

Beef

820

Papadopoulos (LS), Miller (RK), Acuff (GR), Vanderzant (C) and Cross (HR). **Effect of sodium lactate on microbial and chemical composition of cooked beef during storage.** *Journal of Food Science* 56(2): 1991: 341-347

821
Smith (GL), Stalder (JW), Keeton (JT) and Papadopoulos (LS). **Evaluation of partially defatted chopped beef in fermented beef snack sausage.** *Journal of Food Science* 56(2): 1991: 348-351

822
Seman (DL), Decker (EA) and Crum (AD). **Factors affecting catalysis of lipid oxidation by a ferritin-containing extract of beef muscle.** *Journal of Food Science* 56(2): 1991: 356-358

823
Ukhun (ME) and Izi (U). **Effects of storage on some chemical indices of beef quality.** *Food Chemistry* 41(1): 1991: 55-62

Mutton

Sheep

Lambs

824
Angelo (AJSt), Koohmaraie (M), Crippen (KL) and Crouse (J). **Acceleration of tenderization/inhibition of warmed-over flavour by calcium chloride-antioxidant infusion into lamb carcasses.** *Journal of Food Science* 56(2): 1991: 359-362

Treatment of freshly slaughtered inhibited lamb carcasses with 0.3 M calcium chloride plus with 1% sodium ascorbate or 0.25% maltol accelerated post-mortem tenderization through activation of calcium dependent proteases, lipid oxidation and retarded the warmed-over flavour development in ground cooked patties. After 2 days storage at 4 C, patties from lamb carcasses treated with antioxidants retained more desirable flavour characteristics (meaty and musty/herby) of lamb, and had less off-flavour (painty and cardboardy) intensities. SRA

Pork

825
Brewer (MS) and Harbers (CAZ). **Effect of packaging on colour and physical characteristics of ground pork in long-term frozen storage.** *Journal of Food Science* 56(2): 1991: 363-366, 370

Products

Ham

826
Gracia (C), Berdague (JJ), Antequera (T), Lopez-Bote (C), Cordoba (JJ), Ventanas (J). **Volatile components of dry cured Iberian ham.** *Food Chemistry* 41(1): 1991: 23-32

Poultry

Chickens

827
Lescano (G), Narvaiz (P), Kairiyama (E) and Kaupert (N). **Effect of chicken breast irradiation on microbiological, chemical and organoleptic quality.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 130-134

High quality chicken half breasts, packed in polystyrene trays wrapped with PVC film, were irradiated in a Cobalt-60 facility with doses of 2.5, 3.0, 3.8 and 4.5 kGy, at 0 C. Storage was at 2 plus or minus 1 C. Microbiological, chemical and organoleptic analyses were performed. On samples irradiated with 2.5 kGy, the aerobic bacteria counts were reduced by about two log cycles, reaching the level of 10^6 CFU/g near day 19 post slaughter. *Escherichia coli*, enterococci, and presumptive *Salmonella* were undetected in irradiated samples. Rancidity, free fatty acids release, and water-holding capacity (WHC) were reduced in the 2.5 kGy samples. Higher radiation doses enhanced this effect on rancidity and WHC, immediately after irradiation. The sensory panel considered samples treated with 2.5 kGy organoleptically good up to day 22. Chicken samples irradiated with higher doses were also considered good up to that day, although flavour and general acceptability were lower. AS

828
Katta (SR), Rao (DR), Sunki (GR) and Chawan (CB). **Effect of γ-irradiation of whole chicken carcasses on bacterial loads and fatty acids.** *Journal of Food Science* 56(2): 1991: 371-372

Bacterial loads on broiler chicken carcasses can be eliminated by more than 99% using γ-irradiation (cobalt-60) at doses ranging from 1.5 to 2.0 kGy under commercial conditions without affecting sensory and nutritional values. Fatty acids were not affected except for palmitic which showed a decrease and oleic acid which showed an increase. BV

Broilers

829
Sams (AR), Birkhold (SG) and Mills (KA). **Fragmentation and tenderness in breast muscle**

from broiler carcasses treated with electrical stimulation and high-temperature conditioning. *Poultry Science* 70(6): 1991: 1430-1433

In each of four replications, broiler carcasses were treated with electrical stimulation (ES) (100 V, 1 A, 1 s on and 1 s off, 14 min) and high-temp. conditioning (HTC) in a 39 C water bath or conventionally processed and chilled. After harvesting at 1 h post-mortem, *Pectoralis* fillets were aged 23 h more and evaluated for cooked meat shear value. *Pectoralis* samples also were collected at 1 h post-mortem, aged for 0 or 23 h more, and analyzed for gravimetric fragmentation index using room air or an oven for drying the residue-laden screens. The results suggested that the ES and HTC treatments prevented myofibrillar fragmentation that occurred in the control carcasses. Also, although fragmentation index and shear value were correlated within the combined ES and HTC treatments, these two parameters were not correlated when the data from all treatment combination were combined. Oven drying improved both the ability of the fragmentation index measurement to resolve differences between treatment means and to evaluate the correlation between this parameter and shear value. Sample aging time was observed to have little effect on the relative differences between treatment means but improved the correlation between fragmentation index and shear value. AS

830

Izat (AL), Yamaguchi (W), Kaniawati (S), McGinnis (JP), Raymond (SG), Hierholzer (RE), Kopek (JM), Mauromoustakos (A). **Use of consecutive carcass rinses and a most probable number procedure and estimate salmonellae contamination of inoculated broilers.** *Poultry Science* 70(6): 1991: 1448-1451

Turkeys

831

Bater (B) and Maurer (AJ). **Effects of fat source and final comminution temperature on fat particle dispersion, emulsion stability and textural characteristics of turkey frankfurters.** *Poultry Science* 70(6): 1991: 1424-1429

Turkey frankfurter emulsions containing turkey thigh meat and 18% turkey fat, pork fat or beef fat were chopped to final comminution temp. of 13, 18 or 23 C and heat processed. Data were obtained on fat particle distribution, fat separation, emulsion stability, shear press value, and proximate analysis to determine an optimum final comminution temp. for turkey frankfurters. At the same final comminution temp., particle size for turkey fat was smallest, pork fat was intermediate, and beef fat was largest. The optimum emulsion stability for different types of fat was dependent on final comminution temp. For turkey fat and pork fat, the optimum final comminution temp. among those compared was 13 C, and the optimum final comminution temp. for beef fat was 18 C. No significantly different shear press values were obtained among the frankfurters. AS

832

Hseih (F), Peng (IC), Clarke (AD), Mulvaney (SJ) and Huff (HE). **Restructuring of mechanically deboned turkey by extrusion processing using cereal flours as the binder.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 139-144

Mechanically deboned turkey (MDT) was extruded with yellow or white corn flour using a twin-screw extruder. The extruder percent torque and specific energy were higher and the extrudates were harder for MDT when white corn flour was added than was the case with added yellow corn flour or rice flour. Die pressure, extrudate thickness and thiobarbituric acid values were not affected by flour type. Lower extrusion temp. produced extrudates that were thinner, softer, darker, less red and less yellow, and resulted in higher extruder percent torque, specific energy and die pressure. The critical role of cereal flours as the binder in restructuring MDT using twin-screw extrusion technology was indicated. AS

833

Genigeorgis (CA), Meng (J) and Baker (DA). **Behavior of nonproteolytic *Clostridium botulinum* type B and E spores in cooked turkey and modelling lag phase and probability of toxigenesis.** *Journal of Food Science* 56(2): 1991: 373-379

A spore pool inoculum (I) of 4 each type B and E nonproteolytic *Cl. botulinum* was applied at levels of $\log_{10}$-2 to 4 spores per 2-3 g sample of cooked turkey (0, 1.47 and 2.2% brine (B), resp.), stored under vacuum at 4, 8, 12, 16, 20 and 30 C up to 180 days. Earliest toxin production at the above temp. (T) was detected in 0% brine meat after > 180, 8, 4, 1.5, 1.5 and 0.5 days, in the 1.47% brine after 70, 8, 7, 2, 1.5 and 1 days, and in the 2.2% brine after 130, 10, 9, 2.5, 1.5 and 1 days, resp. Lag phase (LP) was affected significantly by T, I, and T x I ($p < 0.001$) but not B ($0.05 < p < 0.1$). The derived model predictive of LP was: $\text{Log}_{10}\text{LP} = 0.625 + 6.710\ (1/T) + 0.0005\ (I) \times (T) - 0.033\ (T) + 0.102\ (B) - 0.102\ (I)$ with $R^2 = 0.970$. More precise sampling plans and augmentation of our dataset will increase confidence in the model. AS

Products

Eggs

834

Matiella (JE) and Hsieh (TC-Y). **Volatile compounds in scrambled eggs.** *Journal of Food Science* 56(2): 1991: 387-390, 426

Scrambled eggs prepared from fresh farm eggs stored in polystyrene cartons for 0 - 2 wk and supermarket eggs packaged in polystyrene cartons were analyzed for volatile compounds by dynamic headspace sampling. high compounds (aldehydes, ketones, alcohols, furans, esters, benzene derivatives (including styrene), alkanes, sulphur-containing compounds and terpene) were identified. Aldehydes were the most abundant volatile compounds in the egg samples. Volatile styrene monomer increased in scrambled egg samples during 2 wk storage of shell eggs in polystyrene containers. Scrambled eggs prepared from supermarket shell eggs contained 7 times more ethylbenzene and styrene than those prepared from fresh farm eggs stored in polystyrene containers for 2 wk. SRA

835

Shah (DB), Bradshaw (JG) and Peeler (JT). **Thermal resistance of egg-associated epidemic strains of *Salmonella enteritidis*.** *Journal of Food Science* 56(2): 1991: 391-393

SEAFOODS

836

Grodner (RM), Andrews (LS) and Martin (RE). **Chemical composition of seafood breading and batter mixes.** *Cereal Chemistry* 68(2): 1991: 162-164

Twenty-four seafood breading and batter mixes were anlayzed by proximate analysis to establish value-added protein guidelines for use in food service and school lunch programs. Protein levels were similar for breading samples: values ranged from 9.10 to 12.80%. All batter mixes except one contained less protein than the breadings, ranging from 2.90 to 15.75%. Fat content varied from 0.20 to 5.30% and moisture content from 8.30 to 11.35%. Carbohydrate values for all breadings and batters ranged from 70 to 79%; crude fiber averaged 0.3%, and ash ranged from 1.00 - 8.05%. Specific amino acid contents were similar for all breading and batter mixes. Chemical scores determined that lysine was the primary limiting amino acid in 16 breading and batter samples and the second limiting amino acid in four samples. These scores were used to compare amino acid contents of various proteins with the reference pattern of the Food and Agriculture Organization, meeting the requirements of young children. Total sulphur-containing amino acids were limiting in 6 samples, and valine and isoleucine were the limiting amino acid in one sample each. AS

Crabs

837

Buchanan (RL). **Microbiological criteria for cooked, ready-to-eat shrimp and crabmeat.** *Food Technology* 45(4): 1991: 157-160

The rationale underlying the microbiological criteria to assess the presence of specific pathogens (*Salmonella*, *Staphylococcus aureus*, *Vibrio*, thermal tolerant coliforms and *Listeria monocytogenes*) and maintenance of process integrity with regard to cooked ready-to-eat shrimp and crabmeat is summarized. CSA

Lobsters

838

Yan (X) and Taylor (KDA). **Studies on the mechanism of phenolase activation in Norway lobster (*Nephrops norvegicus*).** *Food Chemistry* 41(1): 1991: 11-21

Shrimps

839

Jiang (S-T), Moody (MW) and Chen (H-C). **Purification and characterization of proteases from digestive tract of grass shrimp (*Penaeus monodon*).** *Journal of Food Science* 56(2): 1991: 322-326

Proteases in grass shrimp (*Penaeus monodon*) digestive tract were extracted. Four fractions, A, B, C and D, demonstrated caseinolytic activity and were purified to electrophoretic homogeneity. A, C and D were trypsin-like, while B was a chymotrypsin-like protease. Optimal temp. for proteases A, B and C were 65 C, and that for D was 55 C for hydrolysis of casein. Optimal pH of proteases A and C was 8.0, and that of D was 7.0 for hydrolysis of p-toluenesulfonyl-L-arginine methyl ester. Optimal pH of protease B for hydrolysis of N-benzoyl-L-tyrosine ethyl ester was 8.0. Inactivation of 50% enzyme activity in 5 min occurred at 67 C for protease B and 50 C for protease A, C and D. AS

840

Mandeville (S), Yaylayan (V), Simpson (B) and Ramaswamy (H). **Isolation and identification of carotenoid pigments, lipids and flavour active components from raw commercial shrimp waste.** *Food Biotechnology* 5(2): 1991: 185-195

Squids

841

Rahman (SMd) and Potluri (PL). **Thermal conductivity of fresh and dried squid meat by line source thermal conductivity probe.** *Journal of Food Science* 56(2): 1991: 582-583

Thermal conductivity (TC) of fresh and dried squid mantle meat determined using a line source probe method varied from 0.52 to 0.04 w/m C at 30 C. TC decreased with decreasing moisture. TC data correlated with moisture content by an exponential form equation. AS

Clams

842

Tanchotikul (U) and Hsieh (TC-Y). **Analysis of volatile flavour components in steamed rangia clam by dynamic headspace sampling and simultaneous distillation and extraction.** *Journal of Food Science* 56(2): 1991: 327-331

The volatile flavour components of steamed rangia clam (*Rangia cuneata*) were extracted by dynamic headspace sampling (DHS) and simultaneous distillation/extraction (SDE) techniques, and analyzed by gas chromatography/mass spectrometry (GC/MS) and GC-coupled aroma perception. Twenty-two heterocyclic aroma compounds were identified. Volatile flavour compounds in other chemical classes, such as aldehydes, alcohols, ketones and terpenes also were identified. The unique clam aromas were contributed by a combination of S-, and N-containing compounds and ketones. In general, sampling methods (DHS and SDE) complemented each other in compounds detected in the sample. However, SDE gave more information on characteristic steamed clam flavours. AS

Fish

843

Eid (N), Dashti (B) and Sawaya (W). **Sub-tropical fish by-catch for surimi processing.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 103-106

Six fish species (catfish, goatfish, lizard, ponyfish, therapon and trevally) were manually processed into fish mince and surimi by using three washing steps (1:3 meat-to-water ratio). Soluble protein and total solids leached out during washing were determined and the colour and texture of surimi gels were tested. Washing caused efficient removal of souble protein, which accounts for 41-58% of total solids leached out. The colour of washed mince was also improved. The texture parameters (stress, true strain and rigidity) of surimi gel prepared from lizardfish, catfish, goatfish and therapon were markedly enhanced by gel setting at 40 C for 30 min or 4 C for 24 h. Incubation at 60 C for 30 min led to soft gels. Lizardfish would be ideal for surimi in terms of texture and colour. The other three fish sp. did not produce very light surimi, but showed reasonable elastic gel properties. AS

844

Beas (VE), Wagner (JR), Anon (MC) and Crupkin (M). **Thermal denaturation in fish muscle protein during gelling: Effect of spawning condition.** *Journal of Food Science* 56(2): 1991: 281-284

Thermal denaturation of myofibrillar proteins from pre- and post-spawning hake by differential scanning calorimetry (DSC), and evaluation of denaturation kinetics under both conditions is dealt in this article. The denaturation enthalpies of all pre-spawning fish muscle extracts were less than those from post-spawning. The area under the DSC thermogram corresponding to myosin denaturation was smaller in myofibrillar extracts from pre-spawning than from post-spawning hake, while the areas corresponding to denaturation of actin were similar. Between 40 and 55 C the myosin denaturation rates were greater for post-spawning than for pre-spawning hake. Both enthalpies and kinetic data indicated proteins of fish in a better biological condition (post-spawned) denature more rapidly and completely. AS

845

Yoon (KS), Lee (CM) and Hufnagel (LA). **Effect of washing on the texture and microstructure of frozen fish mince.** *Journal of Food Science* 56(2): 1991: 294-298

Textural hardening of fish mince during storage was investigated by examining texture and structure of unwashed and washed fish mince. Washing reduced TMAO and increased water-binding ability, but did not prevent development of hard, rubbery texture in fish mince during frozen storage. Transmission electron microscopy showed more shrinkage of myofibrillar units (sarcomeres) occurred in washed than unwashed mince. Textural hardening of washed mince was thus

related to increased freeze-induced contraction of myofibrils. Removal of water-soluble sarcoplasmic proteins facilitated freeze-induced contraction of myofibrils, leading to textural hardening. This suggested that water soluble proteins retard sarcomere shrinkage resulting from freeze-induced contraction/protein cross-linking. AS

846

Rebeca (BD), Pena-Vera (MT) and Diaz-Castaneda (M). **Production of fish protein hydrolysates with bacterial proteases: yield and nutritional value.** *Journal of Food Science* 56(2): 1991: 309-314

This study was conducted to observe the effect of three bacterial proteases under different hydrolysis conditions on yield of soluble fish protein. The nutritional value of fish protein hydrolysates obtained was evaluated in a study with rats. Results showed that protein was solubilized faster with pescalase 560 than with HT-200 or protease N. 80 to 85% nitrogen was recovered after 2 h hydrolysis with pescalase 560 or 3 h with HT-200 and protease N. The recovery of soluble nitrogen improved with increase in protease concn. following a quadratic trend. Yields of 13 to 15% in terms of whole fish were obtained at the pilot plant. Products contained 83 to 86% protein of which 70 to 80% was soluble. Reactive lysine was 70 to 85%. Body wt. gain, feed efficiency, PER and NPR were reduced by inclusion of fish protein hydrolysates in diets. The nutritional value of hydrolysates was 10 to 15% lower than that of casein. Results suggest that fish protein hydrolysates can be used in the food industry for their solubility and nutritional value. SRA

847

Kelleher (SD) and Hultin (HO). **Lithium chlorides as a preferred extractant of fish muscle protein.** *Journal of Food Science* 56(2): 1991: 315-317

Lithium chloride yielded better extraction of fish muscle protein than sodium or potassium chloride under most conditions. In addition, constancy of extracted protein was better with lithium compared to potassium or sodium chlorides with respect to blending time, salt concn., pH, temp. and foaming. With stored red hake muscle, LiCl was superior to NaCl with better extractability of protein and more linear reduction of extractability with storage time. Evidence indicated the superior performance of lithium compared to sodium was due to stabilization by lithium chloride of fish proteins towards denaturation. AS

848

Alur (MD), Venugopal (V), Nerkar (DP) and Nair (PM). **Bacterial spoilage profiles to identify irradiated fish.** *Journal of Food Science* 56(2): 1991: 332-334, 351

Bacterial growth (*Aeromonas hydrophila*, *Salmonella typhimurium*, *Bacillus megaterium* and *Pseudomonas marinoglutinosa*) and accompanying formation of volatile basic nitrogen compounds in membrane - sterilized soluble protein fraction of Indian mackerel was examined, and influence of irradiation of shrimps at varying does ranging from 0 to 5 kGy on the spoilage of shellfish has been studied. Results showed that bacteria profile rated well in unirradiated and irradiated fish, but formation of volatile acid and volatile base were lower in irradiated than unirradiated counterparts. Total volatile acids and total volatile basic nitrogen produced by the organisms or mixed flora from fish were only 30 - 50% those of controls. A method for identifying radiation - processed fish could evolve based on lower susceptibility of irradiated fish to bacterial spoilage. SRA

849

Luong (JHT), Male (KB) and Huynh (MD). **Applications of polarography for assessment of fish freshness.** *Journal of Food Science* 56(2): 1991: 335-337, 340

Fish freshness was assessed with an enzymatic method using a polarographic probe at 0.7 volt (platinum vs silver) to monitor degradation of inosine monophosphate (IMP), inosine (H x R), and hypoxanthine (Hx). The K-value, a ratio of H x R + Hx/IMP + H x R + Hx, was determined in Sockeye salmon, Pacific cod and Pacific herring in ice and at 12 C. Results were compared with those from HPLC and sensory scores. K-values by polarography correlated well with HPLC. Loss of freshness accompained rise in K-value in all studies. Sensory scores correlated relatively well with K-values in Sockeye salmon and Pacific herring but less with Pacific cod. K-value did not reflect eating quality of Pacific cod. AS

850

Ko (W-C), Tanaka (M), Nagashima (Y), Taguchi (T) and Amano (K). **Effect of pressure treatment on actomyosin ATPases from flying fish and sardine muscles.** *Journal of Food Science* 56(2): 1991: 338-340

The effect of pressure treatment (1 atm. - 5000 atm.) on flying fish and sardine actomyosin ATPases was studied from the standpoint of interaction between myosin and actin. The activities of actomyosin Mg-ATPases markedly decreased and those of the EDTA-ATPases rapidly increased with prolonged

pressure treatment at 300 atm. and 5000 atm. Changes in activities of F-actin plus pressure-treated myosin Ca-ATPases showed results similar to those of pressure-treated actomyosin Ca-ATPases, while myosin plus pressure-treated F-actin resulted in decreased Mg-ATPase activity and increased EDTA-ATPase activity. AS

851

Miyazawa (T), Kikuchi (M), Fujimoto (K), Endo (Y), Cho (S-Y), Usuki (R), Kaneda (T). **Shelf-life dating of fish meats in terms of oxidative rancidity as measured by chemiluminescence.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 39-43

A versatile and speedy chemiluminescence method for predicting shelf life of 6 sp. fish sardine, red sea bream, tuna, kichiji, mackerel meats is discussed. The chemiluminescence intensity of fresh fish meats increased in proportion to the measuring temp. and differed significantly among fish meats. The shelf-life of fish meats was estimated based on oxidative deterioration as measured by peroxide (PV), carbonyl and thiobarbituric acid values, as well as sensory evaluation during storage of the fish meats at 0 C. The shelf-life of minced fish meats as judged by oxidative deterioration significantly correlated with chemiluminescence intensity of the fresh meats. This method can also be applied for the prediction of shelf-life of other products such as cereals, fried snack foods, fresh meat, frozen meat, seafood, coffee, tea etc. BV

Albacore

852

Price (RJ), Melvin (EF) and Bell (JW). **Postmortem changes in chilled round, bled and dressed albacore.** *Journal of Food Science* 56(2): 1991: 318-321

Albacore were killed by brain destruction, dressed, bled or left round, chilled in sea water/ice slurry at 1.1 C, and stored in ice. Fish were analyzed for 33 days for aerobic plate count (APC), pH, salt, histamine, trimethylamine nitrogen (TMA-N), and nucleotide content. Dressed albacore cooled faster than round or bled albacore. No significant differences were evident in APC, pH, salt, TMA-N, or nucleotide content of round, bled and dressed albacore. Histamine was detected only at day 33. TMA-N, inosine monophosphate and hypoxanthin content, and nucleotide ratios appeared to be useful indices of storage life. AS

Antarctic fish

853

Manthey (M), Oehlenschlager (J) and Rehbein (H). **Keeping quality and shelf-life of frozen stored battered and unbattered portions cut from fillet blocks of Antarctic fish.** *International Journal of Refrigeration* 14(1): 1991: 58-64

Products

Fish

854

Steele (FM), Huber (CS), Orme (LE) and Pike (OA). **Textural qualities of turkey frankfurters incorporating fish- and turkey-based surimi.** *Poultry Science* 70(6): 1991: 1434-1437

Experimental turkey-based surimi and fish-based surimi were separately incorporated into a formulation for turkey frankfurters at levels of 0, 2.5, 5 and 10%. Frankfurters containing 10% turkey-based surimi or 10% fish-based surimi were significantly lower ($P < 0.05$) than the control in fat and higher in expressible moisture and resistance to shear. No difference existed between treatments and control in moisture, protein, cooked yield, or resistance to puncture. The microstructure of the protein matrix, examined with scanning electron microscopy at 400x, was compact in frankfurters containing fish-based surimi. Incorporation of turkey-based surimi had no observable effect on frankfurter microstructure. AS

855

Sych (J), Lacroix (C) and Carrier (M). **Determination of optimal level of lactitol for surimi.** *Journal of Food Science* 56(2): 1991: 285-290, 298

Cryoprotective effects of lactitol dihydrate at 2, 4, 6 and 8% levels in cod surimi were investigated and compared to an industrial control (1:1 mixture of sucrose/sorbitol at 8% w/w) and to a control without additive. Stability of protein functional properties was monitored by salt extractable protein and differential scanning calorimetry analyses, as well as texture profile analyses of cooked gels for surimi stored at -12 C for 8 wk. Data revealed the excellent cryoprotective properties of lactitol. Moreover, the level of lactitol in surimi could be reduced to 5.7 - 6.4% w/w without significant alteration of stabilizing effects. AS

856

Himelbloom (BH), Brown (EK) and Lee (JS). **Microbiological evaluation of Alaska shore-based surimi production.** *Journal of Food Science* 56(2): 1991: 291-293, 314

Two shore-based surimi plants in Alaska were investigated to determine microbial conditions of Alaska pollock flesh during processing. Median aerobic plate count (APC) was 2.0×10^3/g after mincing, 2.3×10^3/g after washing/screening, 4.2×10^4/g after refining and 1.6×10^4/g after dewatering. Reprocessing, needed for nonanalog grade surimi, resulted in APC of 1.2×10^5/g after a second refining and 3.0×10^5/g after a second dewatering. The APC for analog grade surimi was 5.5×10^4/g and 2.0×10^6/g for nonanalog grade surimi. Highest total coliform most probable number (MPN) of > 1100/g was determined from a nonanalog grade surimi sample and from a mince that had been refined twice. Highest *Escherichia coli* MPN of 460/g as determined from two minces. AS

857

Himelbloom (BH), Brown (EK) and Lee (JS). **Microorganisms isolated from surimi processing operations.** *Journal of Food Science* 56(2): 1991: 299-301

Heterotrophic bacteria isolated from two shore-based surimi processing plants in Alaska were identified to the genus level. In one plant, the major bacterial constituents were *Flavobacterium* and *Pseudomonas*, followed by *Moraxella*, *Aeromonas*, *Lactobacillus*, *Serratia*, and *Acinetobacter*. In the other plant, major bacterial groups were *Flavobacterium* and *Arthrobacter/Corynebacterium*, followed by *Pseudomonas* and *Acinetobacter*. *Pseudomonas*, *Aeromonas*, and *Serratia* were capable of rapid growth as low as 8 C, with respective generation times 3.0, 3.1 and 3.6 h. Freezing and thawing of surimi reduced microbial counts to 45 - 67% of the pre-frozen load; however, the composition of the microbial flora was maintained. The plant environment was a potential source of microbial contamination. AS

858

Wang (DQ) and Kolbe (E). **Thermal properties of surimi analyzed using DSC.** *Journal of Food Science* 56(2): 1991: 302-308

Thermal properties of surimi made from Alaska pollock (*Theragra chalcogramma*) were analyzed using differential scanning calorimetry (DSC) in the freezing range. Each dynamically corrected thermogram was used to determine initial freezing point, unfreezable water (bound water), apparent specific heat, enthalpy and unfrozen water wt. fraction. When water content was controlled at 80.3% (wet basis), the cryoprotectant concn. had little effect on thermal properties in the unfrozen and fully frozen (-40 C) ranges. However, the initial freezing point and thermal properties just below this point were significantly affected. The study also demonstrated the great potential of DSC for measuring and modeling frozen food thermal properties. AS

PROTEIN FOODS

Weaning foods

859

Marero (LM), Payumo (EM), Aguinaldo (AR), Matsumoto (I) and Homma (S). **Antinutritional factors in weaning foods prepared from germinated cereals and legumes.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 177-181

The effect of germination, flour and gruel preparation on the amount of antinutritional factors in rice, corn, mungbean and cowpea, as well as in four weaning foods from 70% 72 h germinated cereal and 30% 48 h germinated legume were studied. Phytates, tannins, trypsin inhibitors, phytohemagglutinins and cyanogenic glycosides were determined, *in vitro* protein digestibility was performed, and an infant tolerance test of weaning foods was conducted. Germination, drying, dehusking, roasting and cooking significantly ($P < 0.05$) reduced antinutritional factors in the materials. Phytates and tannins in cooked gruel, ultimately, were too small to be of nutritional significance. Antitrypsin activity was almost nil in cooked gruels, while phytohemagglutinin activity was virtually eliminated. Increase in *in vitro* protein digestibility was noted from the flour form to the cooked gruel. All 4 formulations were well-tolerated by infants who showed no signs of stomach disorders, vomiting, rashes or fever throughout the 10-day feeding test. AS

860

Adewusi (SRA), Orisadare (BO) and Oke (OL). **Studies on weaning diets in Nigeria. I. Carbohydrate sources.** *Cereal Chemistry* 68(2): 1991: 165-169

Ogi is an fermented cereal porridge and a popular weaning, breakfast, and covalescent food in Nigeria. It is made from sorghum in the northern part of the country, where sorghum is cultivated abundantly, and from maize in the heavy rain belt of the south. In this study, *ogi* was made from white and yellow maize and from white and red sorghum and compared with other carbohydrate sources in a simulated weaning diet. The yield of *ogi* was 66.0 - 75.9%, and the protein content was 7.53-9.28%, compared with 8.05% for breadfruit and 1.05% for cassava starch. Reducing sugar was 2.85% in

breadfruit and 0.03-0.08% in the others. White sorghum *ogi* contained the highest energy (4.07 kcal/g) and the lowest ash (0.32%), whereas cassava starch contained the lowest energy (3.38 kcal/g) and the highest ash (3.91%). Fat content was 5.5% in maize *ogi*, 2.97% in sorghum *ogi*, and 1.92% in breadfruit. Processing grains into *ogi* reduced the tannin content by 64-100% and phytate by 72-93%. Cyanide was not detected in sorghum *ogi* or cassava starch. In the rat bioassay, feed intake was highest (78.3g) in a red sorghum *ogi*-casein diet (13% protein level) and lowest in a corn starch diet (59.4g). Wt. gain, protein efficiency ratio, and net protein ratio values were highest in the cassava diet (25.2, 2.6 and 3.9g resp.), followed by breadfruit and corn starch; the lowest values were recorded with a white sorghum *ogi* diet (wt. gain 9.5 g, protein efficiency ratio 1.0, and net protein ratio 2.2). Protein digestibility was high (93.0-97.1%) for all diets. *In vitro* starch digestibility was highest in corn starch, followed by breadfruit, and lowest in white sorghum and yellow maize*ogi*. Using a first-order kinetics equation, breadfruit had the highest initial rate of starch hydrolysis ($t_{1/2}$ for 19.4 min), followed by corn starch (26.1 min); the lowest was for white sorghum *ogi* (109.7 min). The bioassay results were therefore explained in terms of starch digestibility and gastric emptying. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

861

Stoewsand (GS), Anderson (JL) and Munson (L). **Inhibition by wine of tumorigenesis induced by ethyl carbamate (urethane) in mice.** *Food and Chemical Toxicology* 29(5): 1991: 291-295

Groups of 18 - 21 male weanling C3H were given, as drinking fliud, tap-water, 12% ethanol solution, one of two commercial white wines, or red wine, *ad lib.* for 41 wk. Ethyl carbamate was added to each of the drinking liquids at levels adjusted to provide av. daily ethyl carbamate intakes of 0, 10 or 20 mg/kg body wt. After 41 wk the cumulative survival of the mice given 20 mg ethyl carbamate/kg in water was depressed compared with the mice drinking wines or ethanol solution with this ethyl carbamate level. Both ethanol and wine treatments reduced the incidence of lung Clara-cell adenomas in mice given 10 mg ethyl carbamate/kg and reduced the frequency (number of specific tumours/number of tumour-bearing mice) of both Clara-cell adenomas in mice given 10 mg ethyl carbamate/kg and of alveolar adenomas in mice given 20 mg ethyl carbamate/kg. Wine treatments also reduced the frequency of hepatocellular adenomas compared with those of other treatment groups, and no hepatocellular carcinomas developed in any of the groups given wine, even with the 20-mg/kg ethyl carbamate dose. The incidence of hepatocellular adenomas in the groups given 10 mg ethyl carbamate/kg was, as shown by chi-square analysis, significantly reduced by the ethanol and wine treatments. The mean wt. gains of mice on all the wine treatments were lower than those of water-treated mice and this may have been a factor in tumor inhibition; however, it is also possible that wine components other than ethanol may play a role in the inhibition of tumor development. AS

862

Correa-Gorospe (I), Polo (MC), Rodriquez-Badiola (E) and Rodriguez-Clemente (R). **Composition of tartrate precipitates in white wines used for making Spanish sparkling wine.** *Food Chemistry* 41(1): 1991: 69-79

Non-alcoholic beverages

Coffee

863

Garcia (R), Arriola (D), de Arriola (MC), de Porres (E) and Rolz (C). **Characterization of coffee pectin.** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 125-129

Pectin from three coffee (*C. arabica*) var., namely Bourbon, Caturra and Catimor, was extracted and purified. Its physico-chemical characteristics were determined. The coffee pectin was of low methoxyl and of relatively low av. mol. wt. It did not form gels with sucrose and acid or with Ca^{++} salts. Coffee pulp (exocarp) was richer in pectin than coffee mucilage. AS

Fruit juices

Apple juices

864

Chou (F), Wiley (RC) and Schlimme (DV). **Reverse osmosis and flavour retention in apple juice concentration.** *Journal of Food Science* 56(2): 1991: 484-487

A relatively small loss of flavour compounds (n-hexanal and ethyl-2-methyl butyrate) from feed juice into the permeate during reverse osmosis (RO) concn. of apple juice using spiral-wound TFCL HP membrane configuration was observed. The % of flavour compounds in retenate at the end of RO

concn. was low. Results indicated a substantial RO processing loss of aroma due to evaporation, thermal degradation and/or membrane "capture". In contrast, non-volatile flavour components (sugars and acids) were lost by permeation. Conc. flavour profile was altered by both processing and permeation losses. In commercial RO concn. of clarified juices, lowering juice temp. (20 C) before RO processing at max. pressure (50 bar) permitted by configuration and membrane types would provide finished conc. with relatively high flavour content at an acceptable flux. BV

Citrus juices

865

Parish (ME). **Microbiological concerns in citrus juice processing.** *Food Technology* 45(4): 1991: 128, 130, 132, 134

Aspects covered include aseptic bulk storage of single-strength chilled citrus juices; fungal spoilage and control; unpasteurized and "lightly" pasteurized products and future research needs. CSA

Orange juices

866

Rodriguez (M), Sadler (GD), Sims (CA) and Braddock (RJ). **Chemical changes during storage of an alcoholic orange juice beverage.** *Journal of Food Science* 56(2): 1991: 475-479, 493

Results of the study showed that except for loss of ascorbic acid, minimal quality changes in the beverage were observed during storage at 4 C. Significant deterioration, measured by loss of ascorbic acid, increase of browning, accumulation of furfural and loss of limonene occurred in product stored at 25 and 40 C. The beverage showed no appreciable changes in alcohol content, °Brix, pH or titratable acid, but showed various volatile aroma compounds. To develop the full market potential of this beverage, inhibition of retardation of undesirable chemical and physical transformations would best be achieved by refrigeration (4 C) and oxygen exclusion. SRA

FATS AND OILS

867

Sonnet (PE) and Gazzillo (JA). **Evaluation of lipase selectivity for hydrolysis.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 11-15

The positional selectivity of several commercial lipases was reevaluated from the point of view of synthetic utility. A 1,2-diglyceride was synthesized, and exposed to typical conditions of lipase-catalyzed hydrolysis (without the enzyme). Little, or no, acyl migration was observed. The recovery of oleic acid from several lipase-catalyzed hydrolsis of 1(3)-palmitoly-2-oleoyl-3(1)-stearoly glycerol (POS) reported here, therefore, must be regarded as due to the presence of the lipases themselves. This could limit the use of such catalysts in schemes requiring high selectivity for the primary positions of triglycerides. Fatty acid selectivity data of the enzymes studied also are presented. AS

868

Trani (M), Ergan (F) and Andre (G). **Lipase-catalyzed production of wax esters.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 20-22

The lipase (triglycerol acylhydrolase, E.C. 3.1.1.3) catalyzed synthesis of wax esters has been investigated via two different approaches. All studies were performed using an immobilized 1,3-specific lipase (Lipozyme from Novo Industries Montreal). The first approach involves reacting stiochiometric amounts of a fatty acid and stearyl alcohol in the presence of lipase. The medium is solvent-free, which allows for high substrate concn. (1.55 M) and use of 5% (w/w) lipozyme. In this raction, max. wax ester synthesis was found to be dependent upon the efficient removal of the water produced by the reaction. Under optimal conditions, yields of 100% were routinely reached after only 2 h. The medium was then exclusively composed of the wax and the enzyme, no purification was required. The second method involves alcoholysis of a triglyceride, in this case triolein, with stearyl alcohol to produce 1,2-diolein, 2-monoolein and the wax ester of oleic acid. Again, no organic solvent was used. The wax ester yield was found to be directly dependent upon the alcohol concn. that was used to modulate the outcome of the reaction towards either the wax or the partial glycerides. The process was applied to the synthesis of waxes from high erucic acid rapeseed oil. AS

Fats

869

Anon. **Low-fat salad dressings demand a total systems solution.** *Prepared Foods* 160(2): 1991: 73

Instant and cook-up tapioca starches imitate the creamy, fatty texture of oils, but have min. set back or retrogradation and hence are suitable for salad

dressings. Other granular starches preserve the integrity of the starch granules, are clean flavoured and disperse easily into cold solutions. GS

870

McNeil (GP), Shimizu (S) and Yamane (T). **High-yield enzymatic glycerolysis of fats and oils.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 1-5

Several triglyceride fats and oils were reacted with glycerol using lipase as catalyst. A batch system with magnetic stirring was used without the addition of any solvents or emulsifiers. In all cases a mixture of mono-, di- and triglycerides was obtained. However, the yield of monoglyceride (MG) depended strongly on the reaction temp: at higher temp. approx. 30% MG was produced at equilibrium while at lower temp. a yield of 85 - 90% MG was obtained for most of the fats examined. The upper temp. limit below which a high MG yield could be attained was designated the critical temp. (T_c). The value of T_c depended on the fat type and was found to vary between 30 and 46 C for naturally occurring hard fats. A high MG yield could not be obtained for fully hydrogenated tallow and lard under the conditions described here. Of the 3 liquid oils examined, rapeseed oil and olive oil had a T_c of 5 C and 10 C resp. whereas a high yield of MG could not be obtained with corn oil at 5 C or greater. The max. yield of MG below T_c also depended on the fat type: the highest yields being obtained for olive oil (90%), palm stearin and milk fat (80%) and the lowest yield for palm oil (67%). In all cases a high yield of MG was accompained by solidification of the reaction mixture. The effect of enzyme type on MG production was examined for palm oil and palm stearin and the effect of water concn. was examined for palm oil. AS

871

McNeill (GP) and Yamane (T). **Further improvements in the yield of monoglycerides during enzymatic glycerolysis of fats and oils.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 6-10

Three approaches were used in an effort to increase the yield of monoglycerides (MG) during the lipase catalyzed reaction of glycerol with triglyceride fats and oils: (i) various commercially available lipases were screened for ability to catalyze MG synthesis: (ii) mixtures of lipases were compared with single lipases: and (iii) two-step temp. programming was applied during the reaction. Of these, temp. programming was found to be the most effective. With an initial temp. of 42 C for 8 - 16 h followed by incubation at 5 C for up to 4 days, a yield of approx. 90 wt.% MG was obtained from beef tallow, palm oil and palm stearin. When the second incubation temp. was greater than 5 C, the yield of MG was progressively lower with increasing temp. In the case of screening of newly available commercial lipase preparations, lipases from *Pseudomonas* sp. were found to be most effective, giving a yield of approx. 70 wt% MG at 42 C from tallow. Lipases from *Geotrichum candidum*, *Penicillium camembertii* (lipase G) and *Candida rugosa* were inactive. A mixture of lipases from *Penicillium camembertii* and *Humicola lanuginosa* was found to be more effective than either enzyme alone, giving a yield of approx. 70 wt% MG using beef tallow or palm oil. A mixture of *Penicillium camembertii* lipase with either *Pseudomonas fluorescens* lipase or *Mucor miehei* lipase was not more effective than *Pseudomonas fluorescens* or *Mucor miehei* lipase alone. AS

872

Kosugi (H), Kojima (T) and Kikugawa (K). **Characteristics of the thiobarbituric acid reactivity of oxidized fats and oils.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 51-55

The thiobarbituric acid (TBA) reactivity of oxidized methyl linoleate, soybean oil, sesame oil, lard, chicken oil and sardine oil was characterized by using four different methods with 0.01% butylated hydroxytoluene (BHT). Optimal pH for the reactivity of most of the oxidised samples was 3-4, and that of some samples was above 5. Introduction of 2 mM t-butyl hydroperoxide (t-BuOOH) or 0.2 mM ferric ion in the reaction markedly enhanced the reactivity. Introduction of 0.2 mM ethylenediamine tetraacetic acid supressed the reactivity. The characteristics of the TBA-reactivity of the samples were similar to those of alkadienals or alkenals. The most preferable method for the estimation of the TBA-reactive substances of the oxidized fats and oils was that using solvents at pH 3.5 with introduction of BHT, and t-BuOOH or ferric ion. AS

SPICES AND CONDIMENTS

Spices

873

Sjoberg (A-M), Manninen (M), Pinnioja (S), Honkanen (E) and Latva-Kala (K). **Irradiation of spices and its detection.** *Food Reviews International* 7(2): 1991: 233-253

This review covers spices and their irradiation (microbial contents of spices, decontamination of spices by irradiation, volatile oil components and irradiation of spices), detection methods (microbial methods, luminometric methods, viscosimetric

methods, analytical methods for the detection of changes in aroma compounds of spices). 73 references. SRA

Ginger

874

Arya (PS). **Ginger processing for profit.** *Indian Food Industry* 10(3): 1991: 34-35

Aspects covered in this article are the selection of ginger rhizomes for processing (grading, washing, trimming, peeling and keeling). The preservation of ginger using sugar syrup and brine and the different processed forms such as Indian preserved ginger (murabba), crystallized ginger, dry ginger, raw dry ginger, and liming of ginger are discussed. The quality requirement, grading of dry ginger and profitability of ginger cultivation are also dealt. CSA

Pepper

875

Shigemura (R), Gerdes (DL) and Hall (WR). **Effect of gamma processing on prepackaged black and white pepper (*Piper nigrum* L.).** *Lebensmittel-Wissenschaft und - Technologie* 24(2): 1991: 135-138

The effects of gamma processing as a means of sterilizing black and white pepper was evaluated. Quality differences between the raw untreated pepper and the irradiated pepper were assessed using standard plate count (SPC), yeast and mold counts, and coliform counts. Flavour components were quantitatively measured using volatile oil and piperine analysis. The samples were processed with dosages of 10 kGy (1.0 Mrad), 17 kGy (1.7 Mrad), and 20 kGy (2.0 Mrad). The SPC of the untreated black pepper was 8.30×10^6 org/g, and the yeast and mold count was 4.70×10^3 org/g. Untreated white pepper had a SPC of 6.90×10^6 org/g, and a yeast and mold count of 9.50×10^4 org/g. The volatile oil content of the untreated black pepper was 2.50% and the piperine content was 2.55%. The untreated white pepper contained 2.00% volatile oil and 2.63% piperine. When compared to the untreated samples, the level of irradiation did not affect the volatile oil or piperine content in the black or white pepper. There was a difference in the microbial count when the untreated pepper was compared to the irradiated pepper. A dose of 10 kGy was found to be effective in obtaining zero plate counts for total bacteria, yeast, mold and coliforms without affecting quality attributes. AS

SENSORY EVALUATION

876

Overbosch (P), Afterof (WGM) and Haring (PGM). **Flavour release in the mouth.** *Food Reviews International* 7(2): 1991: 137-184

Review. 121 references. SRA

FOOD STORAGE

877

Kachru (RP) and Dakshinamurthy (A). **Improved storage techniques prevent immense grain losses.** *Indian Farming* 41(3): 1991: 21-24

This paper reviews the available storage techniques and recommends some 'dos' and 'dont's' as improved storage technique to further curtail Rs 5000 million worth of annual food grain loss. It is estimated that the loss of grains is 0.48 - 1.47% in metal bins, 2.39 - 4.89% in gunny bags and 3.43 - 5.34% in other local storage structures. Indian Grain Storage Institute, Hapur has developed bins made of galvanized-iron, aluminium or mild-steel sheets and Central Institute of Agricultural Engineering, Bhopal has developed low-cost coaltar drums. Silos made of metal or concrete with capacity 35 - 50 tonnes are better for preventing moisture and pests. Cereals with moisture limit 10 - 12%, pulses 10% and oilseeds 6 - 7% can store well upto 32 C temp. On pest management, ventilation control, use of ninhydrin to destroy hidden infestation, use of plant-products, carbon dioxide and biogas, cross-infestation and curative measures are discussed. Different types of storage structures, capacity, cost and Institutes where they were developed are also listed. SD

INFESTATION CONTROL AND PESTICIDES

878

Abraham (RA) and Jagannathan (D). **Impact of diet counselling on selected obsese cardiovascular patients.** *Indian Journal of Nutrition and Dietetics* 26(9): 1989: 249-253

The socio-economic status of the cardio-vascular patients has been studied. Diet counselling was imparted for a period of six wks, for 15 cardio-vascular patients. The changes in height, wt., triceps skinfold thickness, blood pressure, total serum cholesterol and lipoprotein fractions were observed, before and after counselling. The changes were not statistically significant due to the short period of study. GS

879

Pallavi Mehta, Kalindi Nanavaty, Sandhya Phadake, Sushma Baxi and Neha Parikh. **Effect of dietary counselling on knowledge gain of middle and high income group diabetics.** *Indian Journal of Nutrition and Dietetics* 26(9): 1989: 260-266

The impact of diet counselling on knowledge gain of 60 diabetic patients belonging to middle and high income group was assessed. Results indicated that there was significant ($P < 0.05$) knowledge gain due to counselling in experimental group as compared to the control group. However, actual practices of the diabetic patients could be improved by frequent counselling, simpler instructions and regular follow up for longer duration. GS

880

Mohan (S), Palaniswamy (PT) and Balasubramanian (M). **New non-insecticidal method of insect control.** *Invention Intelligence* 25(7): 1990: 326-327

A new method of insect control using biogas has been developed. The biogas (10 l at 14 kg/cm^2 pressure) which mainly consists of methane and CO_2 was used to fumigate the bin stored rice weevil infested paddy and sorghum. The gas was allowed to remain for 10 days. 100% disinfestation was noticed. No undesirable changes in germination or cooking quality was observed. BV

881

Zhang (D), Hendricks (DG), Mahoney (AW), Yu (Y), Thannoun (AM), Sisson (DV). **Bioavailability of total dietary iron from beef and soy protein isolate, alone or combined, in anemic and healthy rats.** *Cereal Chemistry* 68(2): 1991: 194-200

Bioavailability of iron from beef, soy protein isolate (SPI), and proportional mixtures of beef and SPI was measured in anemic and healthy weaning rats. Diets were prepared by mixing beef and SPI with dietary ingredients at beef-to-SPI iron ratios of 100:0, 75:25, 50:50, 25:75, or 0:100. A casein diet supplemented with $FeSO_4$ was used as the reference diet. The respective mean hemoglobin regeneration efficiency (HRE) and apparent iron absorptions were 37 and 44% for anemic rats and 42 and 37% for healthy rats when the beef-based diet was fed, and 56 and 66% for anemic rats and 42 and 53% for healthy rats when the SPI-based diet was fed. The HRE and apparent iron absorption were 71 and 72% for anemic and 44 and 60% for healthy rats fed the diet supplemented with $FeSO_4$. Generally, anemic rats utilized more dietary iron than healthy rats. This iron status effect was greatest in rats fed the supplemented diet, less (but significant) in rats fed the SPI diet, and not significant in rats fed the beef diet. Beef-SPI mixtures enhanced iron bioavailability when fed to healthy rats, as indicated by a significant, positive binomial curve of the iron bioavailability values versus dietary proportions of beef and SPI iron. However, this enhancement did not occur when the beef-SPI mixtures were fed to anemic rats. The correlation coeff. between HRE and apparent iron absorption was high ($r = 0.83$) for the pooled data. AS

882

Hewedy (FM), Murphy (C) and Cremin (FM). **Effect of zinc deficiency on folate absorption in rats.** *Food Chemistry* 41(1): 1991: 93-98

Rats fed on zinc-deficient diet showed a reduction of 23% plasma zinc level, and 22% in folate level, the latter due to lack of pancreatic conjugate (54.8% reduction). SD

BIOCHEMISTRY AND NUTRITION

883

Arnold (AR), Bascetta (E) and Gunstone (FD). **Effect of sodium chloride on pro-oxidant activity of copper (II) in peroxidation of phospholipid liposomes.** *Journal of Food Science* 56(2): 1991: 571-573, 578

884

Cheng (YJ) and Brittin (HC). **Iron in food: Effect of continued use of iron cookware.** *Journal of Food Science* 56(2): 1991: 584-585

Foods cooked in iron utensils showed greater iron content than that in foods cooked in non iron utensils through continued use of the iron utensils for 50 times. Thus adjustments may be advisable in determining dietary iron intake when food is cooked in iron utensils. The migration of iron into food from utensils is of considerable benefit because enhancing factors can increase absorption of nonheme iron making it more bioavailable. SRA

TOXICOLOGY

885

Groten (JP), Sinkeldam (EJ), Muys (T), Luten (JB) and Van Bladeren (PJ). **Interaction of dietary Ca, P, Mg, Mn, Cu, Fe, Zn and Se with the accumulation and oral toxicity of cadmium in rats.** *Food and Chemical Toxicology* 29(4): 1991: 249-258

886

Hecht (DW). **Bovine somatotropin safety and effectiveness. An industry perspective.** *Food Technology* 45(4): 1991: 118, 123-124, 126

The author discusses aspects such as how bovine somatotropin came into being and its impact on the food industry: safety: opposition to it: regulatory and consumer perception, implications and public benefits. CSA

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